



Washington, DC ★ 2011

---

---

## 22<sup>ND</sup> INTERNATIONAL

Technical Conference on the Enhanced Safety of Vehicles

Modern Vehicle Safety in a Global Society:  
Celebrating 40 Years of Collaboration

### Final Program



U.S. Department of Transportation  
**National Highway Traffic Safety  
Administration**





U.S. Department of Transportation  
**National Highway Traffic Safety  
Administration**

ORGANIZING COMMITTEE CHAIRPERSON

**John Maddox**  
Associate Administrator for Vehicle Safety Research  
Email: John.Maddox@dot.gov

SCIENTIFIC-SECRETARIAT

**Donna E. Gilmore**  
ESV Technical Coordinator  
Email: Donna.Gilmore@dot.gov

LEAD TECHNICAL ADVISOR

**Stephen A. Ridella**  
Director, Office of Applied Vehicle Safety Research  
Email: Stephen.Ridella@dot.gov

STUDENT SAFETY TECHNOLOGY DESIGN COMPETITION

**Arthur Carter**  
Competition Coordinator  
Email: Arthur.Carter@dot.gov

SCIENTIFIC REVIEW COMMITTEE

Abstract submission closed on October 4, 2010. Each abstract was assigned to a minimum of two scientific experts for review. The review committee, composed of international experts in various subject areas, reviewed the abstract(s) and reported their recommendations to the Technical Session Chairperson for final paper selection. The deadline for final paper submission was March 16th, 2011.

CONFERENCE SECRETARIAT

ESV 2011 Registration Office  
American Small Business Alliance, Inc  
www.asballiance.com

Committee Information	2
Table of Contents	3
Words of Welcome	4
Program Overview	6
Conference Site Floor Plan	11
ESV 2011 Award Recipients	14
U.S. Government Special Awards of Appreciation	14
U.S. Government Awards for Safety Engineering Excellence	18
Plenary Session, Monday June 13	22
Oral Presentations	23
Tuesday, June 14	23
Wednesday, June 15	38
Thursday, June 16	52
Written Papers	59
Social Program	71
Technical Events	72
General Conference Information	74
The ESV Exhibition in Detail	79
Exhibitor Information	79
Exhibitor Floor Plan	88
List of Exhibitors	90
22nd ESV Government Focal Points	92

## Words of Welcome



**The Honorable Ray LaHood**

Secretary, U.S. Department of Transportation

On behalf of President Barack Obama, it is my pleasure to extend an invitation to participate in the 22nd International Technical Conference on the Enhanced Safety of Vehicles.

At the U.S. Department of Transportation, safety is our highest priority. The conference represents an important opportunity to work together to improve the safety of motor vehicles. Over the past 40 years, the combined efforts of the automotive industry, government, and the safety community have reduced the number of traffic deaths and injuries in many parts of the world through voluntary improvements and government safety regulations.

As we celebrate the achievements of the last four decades, let us also recommit ourselves to the task of further raising the safety bar. Our continued progress depends on sharing our best ideas. Please accept my best wishes for a successful conference.



**The Honorable David L. Strickland**

Administrator, National Highway Traffic Safety Administration

On behalf of the United States Secretary of Transportation Ray LaHood and the U.S. Department of Transportation, I cordially invite you to this Nation's Capitol to attend the 22nd International

Technical Conference on the Enhanced Safety of Vehicles and to enjoy the sights and sounds of Washington, D.C.

The 22nd ESV Conference will celebrate 40 years of global collaboration in automotive safety and re-energize our work to reduce motor vehicle fatalities and injuries from traffic crashes. By bringing together the collective expertise and judgment of renowned international researchers, we hope to share ideas and transfer knowledge in the all-important areas of vehicle safety to minimize the adverse impact of traffic crashes around the world.

The automobile industry is on the threshold of a new era in vehicle safety. New and developing advanced vehicle technologies offer us a very realistic opportunity to dramatically reduce the tragic toll that vehicle crashes take on the world's population. Safety technologies are changing rapidly and researchers everywhere are working on innovative approaches to develop effective safety countermeasures across international boundaries. There is no better time or place to chart the future course of action for safety than at the 22nd ESV Conference. I look forward to the results of this conference and wish you an enjoyable visit to Washington, D.C. and the surrounding area.

Program Overview

Sunday June 12	3:00 p.m. – 6:00 p.m.	<b>Registration</b> <i>Convention Center—Level 1 (Prince George’s Exhibition Hall D &amp; E Foyer)</i>	
Monday June 13	8:00 a.m. – 9:00 a.m.	<b>Registration</b> <i>Convention Center—Level 1 (Exhibition Hall D &amp; E Foyer)</i>	
	8:45 a.m. – 9:00 a.m.	<b>Williamsburg Field Musick</b> (Procession) <i>Woodrow Wilson A</i>	
		<b>Refreshments on Hotel Ballroom Level 2 Annapolis Foyer</b>	
	9:00 a.m. – 9:15 a.m.	<b>Welcoming Remarks, and Introduction of U.S. DOT Secretary</b> <i>Woodrow Wilson A</i> Stephen Ridella, Emcee	
	9:15 a.m. – 9:30 a.m.	<b>Keynote Address</b> The Honorable Ray LaHood, U.S. DOT Secretary	
	9:30 a.m. – 9:45 a.m.	<b>Official Remarks</b> The Honorable David L. Strickland, NHTSA Administrator	
	9:45 a.m. – 10:45 a.m.	<b>U.S. Government Awards</b> John Maddox, AA Vehicle Safety Research	
	10:45 a.m. – 11:00 a.m.	<b>Organization Details</b> Stephen Ridella, Emcee	
	11:00 a.m. – 11:30 a.m.	<b>Exhibition Opening &amp; Tour</b> All Participants	
	11:30 a.m. – 1:00 p.m.	<b>Lunch Break in Prince George’s Exhibition Hall D &amp; E</b>	
	1:00 p.m. – 3:00 p.m.	<b>Plenary Panel Session</b> <i>Woodrow Wilson A</i> The Next Frontier in Advancing Global Safety	
	3:00 p.m. – 3:30 p.m.	<b>Coffee Break on Hotel Ballroom Level 2 Annapolis Foyer</b>	
	3:30 p.m. – 6: 00 p.m.	<b>Government Status Reports</b> <i>Woodrow Wilson A</i> GFP Members	
			<b>Exhibition</b> <b>11:00 a.m.–5:30 p.m.</b> <i>Prince George’s Exhibition Hall D &amp; E Level 1</i>
	7:00 p.m. – 9:00 p.m.	<b>Welcome Reception</b> <i>Orchard Terrace Lawn, National Harbor</i>	

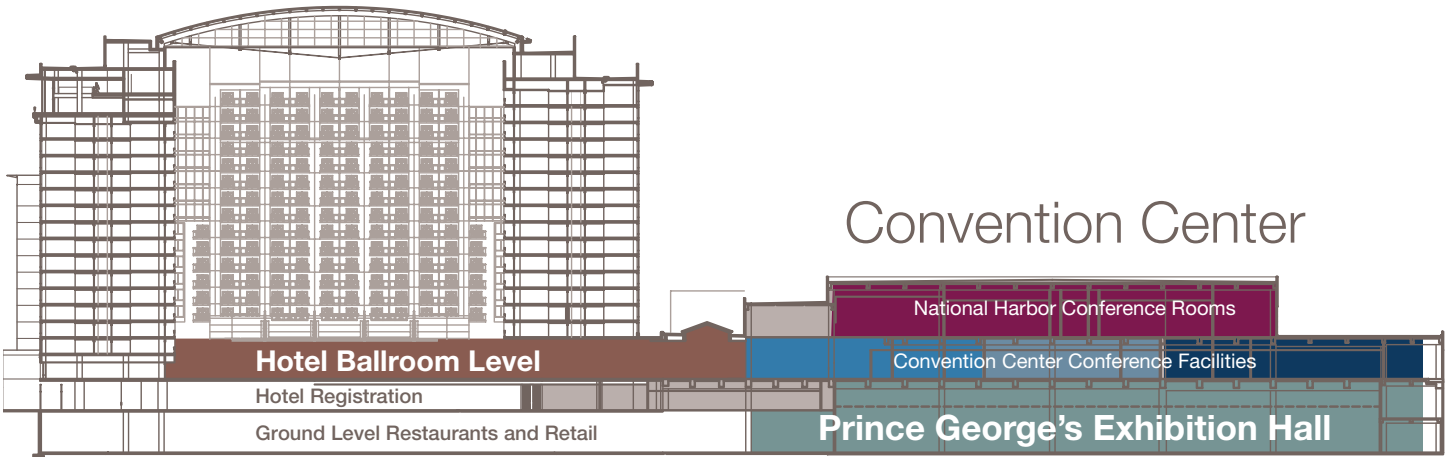
Program Overview

Tuesday June 14	9:00 a.m.–12:30 p.m.	<b>Track A</b> Annapolis 1 & 2  Biomechanics #1: Crash Injury Analysis: Test and Computer Methods  U.S. / FRANCE	<b>Track B</b> Woodrow Wilson A  Side Impact and Rollover Crashes: Prevention and Occupant Protection  GERMANY / U.S.	<b>Track C</b> Annapolis 3 & 4  Assessment of Strategies for Integrated Improvements in Fuel Economy and Safety, Including Use of Alternate Fuels & Batteries  NETHERLANDS / ITALY	<b>Exhibition</b>  9:00 a.m.–5:30 p.m.  Prince George's Exhibition Hall D & E  Level 1
	12:30 p.m.–2:00 p.m.	Lunch Break in Prince George's Exhibition Hall D & E			
	2:00 p.m.–5:30 p.m.	<b>Annapolis 1 &amp; 2</b>  Biomechanics #2: Development of Crash Test Dummies Related Instrumentation and Analysis Techniques  JAPAN / U.S.	<b>Annapolis 3 &amp; 4</b>  Assessment of Performance of Occupant Protection Systems for Children, Older Adults and Other Vulnerable Occupants  U.K. / U.K.	<b>Woodrow Wilson A</b>  *Advanced Technology #1: Safety Performance and Effectiveness of Driver Assistance Technologies, Test and Evaluation Procedures, Benefits Assessment  U.S. / SWEDEN	
Wednesday June 15	9:00 a.m.–12:30 p.m.	<b>Track A</b> Annapolis 1  Student Safety Technology Design Competition, Finalist Oral Presentations	<b>Track B</b> Annapolis 2-3-4  Panel Discussion Vehicle Safety: Regulatory Compliance & Enforcement and Defects Investigations  U.S. / JAPAN	<b>Track C</b> Woodrow Wilson A  Advanced Technology #2: Human Performance and Driver Behavior  U.S. / GERMANY	<b>Exhibition</b>  9:00 a.m.–5:30 p.m.  Prince George's Exhibition Hall D & E  Level 1
	10:45 a.m.–12:30 p.m.		*Continuing Advanced Technology #1  U.S. / SWEDEN		
	12:30 p.m.–2:00 p.m.	Lunch Break in Prince George's Exhibition Hall D & E			
	2:00 p.m.–5:30 p.m.	<b>Annapolis 1 &amp; 2</b>  Restraint System Design and Performance Challenges: Effects of Future Fleet Changes  U.S. / NETHERLANDS	<b>Annapolis 3 &amp; 4</b>  Advancements in Pedestrian and Other Vulnerable Non-Occupant Road User – Safety  SWEDEN / AUSTRALIA	<b>Woodrow Wilson A</b>  NCAP and Other Non-Regulatory Strategies for Improving Safety  AUSTRALIA / U.S.	
	7:00 p.m.–11:00 p.m.	Gala Dinner			

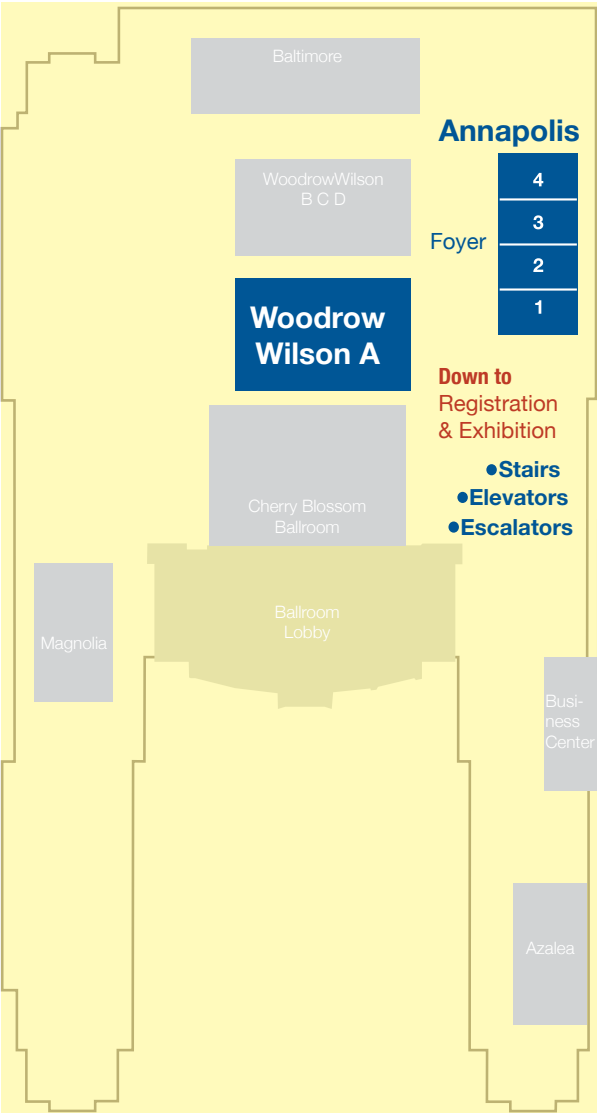
# Program Overview

Thursday June 16	9:00 a.m.–12:30 p.m.	<b>Track A</b> Woodrow Wilson A Vehicle Structural Design Changes: Implications for Frontal Impact Protection and Compatibility U.K. / CANADA	<b>Track B</b> Annapolis 1 & 2 Advances in Driver Assistance Systems for Heavy Trucks and Buses & All Aspects of Motorcycle Safety U.S. / KOREA	<b>Track C</b> Annapolis 3 & 4 Assessment of New and Improved Field Data Collection & Analysis Methods GERMANY / U.S.	<b>Exhibition</b> 9:00 a.m.–12:00 p.m. <i>Prince George's Exhibition Hall D &amp; E Level 1</i>
	12:30 p.m.–1:00 p.m.	Closing Ceremony—Student Winners Announced			Woodrow Wilson A
	1:00 p.m.–2:00 p.m.	Light Lunch in Prince George's Exhibition Hall D & E			

## Conference Site Floor Plan

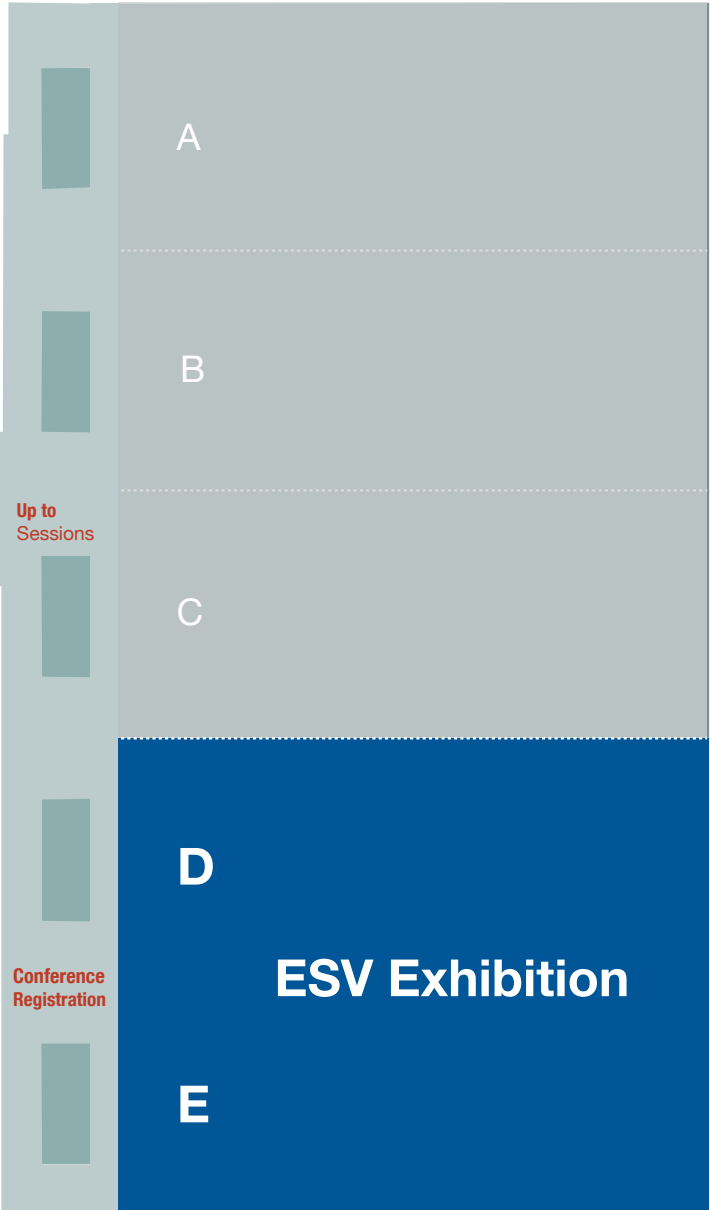


Conference Site Floor Plan



Hotel Ballroom Level  
Hotel Meeting Space | Level 2

Prince George's Exhibition Hall  
Convention Center | Level 1



## ESV 2011 Award Recipients

### U.S. Government Special Awards of Appreciation

**In recognition of and appreciation for outstanding leadership and special contributions in the field of motor vehicle safety**



#### **Gyu Hyun Kim**

**Korea Automobile Testing & Research Institute, TS  
Korea**

Mr. Gyu Hyun Kim, lead engineer of the vehicle safety division in Korea Automobile Testing & Research Institute (KATRI), was responsible for the research to help establish the Korean motor vehicle safety standards for occupant protection and fuel system that came into force in January 1994. He was also involved in the development of vehicle crash test facilities at KATRI from 1990 to 1993. He was responsible for implementing the compliance test for the motor vehicle safety standards and in investigating vehicle manufacturing defects. From 1996 to 1997, Mr. Kim led the research for the first Korean frontal New Car Assessment Program (KNCAP) test that was implemented in 1999. Publication of consumer information from KNCAP has brought forth vehicles with better safety performance, thus significantly reducing casualties in vehicle accidents. His continued research has enabled assessment of vehicle lateral and pole crash protection, pedestrian protection, offset frontal crash performance and overall safety ratings. These safety improvements have largely contributed toward achieving the government's ambitious goal to reduce the number of fatalities in vehicles by fifty percent.

In recognition of his contributions to the enhancement of vehicle safety for more than 20 years through the improvement of vehicle safety standards, regulations and consumer information, Mr. Kim is recognized with this Special Award of Appreciation.



#### **Thomas Broberg**

**Volvo Car Corporation  
Sweden**

Mr. Thomas Broberg has been the driving force behind many successful and innovative state-of-the-art safety technologies developed during the past decade at Volvo Cars. His technical

contributions through research has enabled Volvo to find technical solutions to address many road traffic safety problems in crash prevention and crash protection. Mr. Broberg has worked at Volvo cars in various positions in safety since 1995. He holds a Master of Science degree in Mechanical Engineering from Chalmers University of Technology and he is currently pursuing his doctorate at Chalmers, focusing on automotive safety for an aging population. He has been a member of the management team at Volvo Cars Safety Centre since 1999 and has held various management positions. In his current role he acts as a Technical Advisor within Safety. Mr. Broberg is credited for launching a large number of ground breaking safety technologies into the market. Those include his patented Front structure, Rollover Protection System, Seat Belt reminder for the rear seat, Child safety: 2-stage integrated booster cushion, Side Impact Protection System generation 4 and 5, Door-Mounted Inflatable Curtain, Compatibility beam for front crash, Alcoguard, Driver alert control, Pedestrian safety with detection and full auto brake, many of which are found in Volvo cars today. Mr. Broberg's personal commitment to extend safety knowledge to new areas has not only included pioneering work like the MIT Aware Car, a joint Massachusetts Institute of Technology/Ford Motor Company research project which he guided in 2007-2009, but also in understanding the safety needs of vulnerable road users. Mr. Broberg is also a dedicated researcher, inventor and advocate for safety internally in Volvo and externally across the globe.

In recognition for his pioneering work in the field of vehicle safety and for his invaluable contributions to safety research, Mr. Broberg is being presented with this Special Award of Appreciation.



#### **Matthew Avery**

**Thatcham, the Motor Insurance Repair  
Research Centre  
United Kingdom**

Mr. Matthew Avery has worked for Thatcham for over 15 years in safety and he has led a research team investigating whiplash since 1998. A driving force in the International Insurance Whiplash Prevention Group, he co-authored the Whiplash Rating system for geometric and dynamic ratings. He drove development of world's first Electronic Stability Control (ESC) consumer ratings - being adopted by both Thatcham and EuroNCAP. The dynamic rating system, based on the use of the BioRID Anthro-



## ESV 2011 Award Recipients

pomorphic Test Device, has been adopted by many insurers. Recently, he led Thatcham's active safety research programme, publishing effectiveness data for the latest systems. An example is the rating system for new vehicles launched in the United Kingdom to promote consumer awareness of ESC fitment and availability. More recently Matthew has led research programmes into Autonomous Emergency Braking with partners to Thatcham. In 2010, he authored two new draft consumer test protocols for 'Car to Car' and 'Car to Pedestrian' tests. These protocols are now being developed further and shared widely within the international research community which is working hard to identify the effectiveness of these new technologies. He has also demonstrated these technologies to a wide range of stakeholders: for example members of the Japanese Government and to Australian Insurers. In the UK he has ensured that the Parliamentary Advisory Council for Transport Safety has been well briefed on these emerging matters. Mr. Avery has published many seminal papers over the last 15 years on whiplash preventions and collision avoidance research and has participated in major motor vehicle safety conferences. He is widely regarded as one of the most pre-eminent researchers in the safety arena. He is also well regarded as an ardent advocate for safety and in representing the interests of the consumer.

For his contributions to active safety, whiplash prevention and collision avoidance research, Mr. Avery is recognized with this Special Award of Appreciation.



**Guy S. Nusholtz**  
Chrysler Group LLC  
United States

Mr. Guy Nusholtz currently manages the experimental and computational mechanics group for advanced research and methods at Chrysler. Prior to this, he was a research scientist at the University of Michigan. He has a Bachelor of Science in Physics and a Master of Science in Bio-engineering. Mr. Nusholtz has been involved in automobile crash safety and biomechanics issues for three decades and while working at the University of Michigan at the Transportation Research Institute (UMTRI) he developed his interest in research in safety-related subjects, especially in biomechanics and human injury. He published several reports and papers over a short period of time while at UMTRI that are still often cited today. He is a long time member of the advisory

committee of the very well-known STAPP Car Crash Conference and he has also been a member of the editorial review board and regular contributor to STAPP for over 20 years. As he moved to the automotive industry from academia, he continued his research interests in applying the research results to vehicle safety applications and human injury prevention. He has many publications in well-renowned refereed journals such as Journal of Neurotrauma, Journal of Orthopedic Research and, International Journal of Crashworthiness as well as many publications on Biomechanics and Occupant Protection through the Society of Automotive Engineers. As a member of the United States Council for Automotive Research, he was involved in initiating an effort to standardize worldwide side impact crash test dummies by making a formal proposal to the International Organization of Standardization to develop a dummy for worldwide use. He is an inventor and holds a U.S. Patent on optimization of a single-point frontal airbag fire threshold.

For his relentless pursuit in understanding human injuries in crashes, his analytical skills in developing methods that have numerous applications in safety and his long-standing dedication to enhancing safety in real world crashes, Mr. Nusholtz is recognized with this Special Award of Appreciation.



**Tony R. Laituri**  
Ford Motor Company  
United States

Mr. Tony R. Laituri has worked in the field of automotive safety, and at Ford Motor Company, since attaining his Masters Degree in Mechanical Engineering from Michigan Technological University in 1988. He has published several technical papers in his field and has won numerous awards for his research. His research has been ground-breaking and rigorous and has led to new insights that have improved safety for the motoring public. Among Mr. Laituri's earliest contributions were studies performed with other safety experts to understand the net benefits of depowering frontal airbags. These studies helped to change FMVSS 208 to allow depowering that reduced the risk of out-of-position injuries without compromising safety for unbelted occupants. More recently, Mr. Laituri has used analysis of field data to help derive injury risk curves for the thorax, knee-thigh-hip, and abdomen that are being used by researchers and safety designers for assessing injury potential in crashes. Mr. Laituri was also

## ESV 2011 Award Recipients

instrumental in the development of a recent internal guideline at Ford Motor Company on control of crash pulses. This information could be an effective way to help protect vehicle occupants in the future. Mr. Laituri's work is considered so important within Ford Motor Company that he has been recognized twice internally with Ford's highest technical honor, the Henry Ford Technology Award. He has also been recognized in 2003 with the Ralph Isbrandt Automotive Safety Engineering Award for the best paper presented at the annual Society of Automotive Engineers Conference.

For his significant contributions to automotive and occupant safety, research on airbag depowering, real world data analysis, and injury risk analyses leading to improved regulations and enhanced safety systems, Mr. Laituri is recognized with this Special Award of Appreciation.

### U.S. Government Awards for Safety Engineering Excellence

**In recognition of and appreciation for exceptional scientific contributions in the field of motor vehicle safety engineering and for distinguished service to the motoring public**



#### Erik Coelingh

Volvo Car Corporation  
Sweden

Dr. Erik Coelingh is a Technical Leader for Active Safety at Volvo Cars and Adjunct Professor at Chalmers University in Sweden. He is an internationally recognized expert in active safety and plays a key role in the fast roll-out of technologies that push the boundaries for automotive safety. He was responsible for Volvo's implementation of Collision Warning with Auto Brake and he led the advanced engineering activities for Volvo's Pedestrian Detection. His current work includes research on Collision Avoidance Technologies for Intersection Accidents, as well as research on autonomous driving support. His key accomplishments include the research and advanced engineering for Volvo's Pedestrian Detection system and Collision Warning with Brake Support both of which have been introduced into new models of Volvo cars.

Dr. Coelingh is responsible for the technical strategy for active safety functions at Volvo Cars, which proposes the roll-out and development of functions like City Safety and Blind Spot Information System.

For his outstanding contributions in extending active safety research and improving vehicle safety design, as well as research on Collision Avoidance Technologies for Intersection Accidents, and autonomous driving support, Dr. Coelingh is recognized with the Award for Safety Engineering Excellence.



#### Hideki Yonezawa

(Awarded Posthumously)

National Traffic Safety and Environment  
Laboratory (NTSEL)

Japan

Mr. Yonezawa completed his graduate engineering education from the graduate school of Saitama University in 1978. He was a dedicated researcher in the area of motor vehicle safety for over 30 years. Some of his early work made significant contributions to the understanding of sudden acceleration of vehicles with automatic transmissions, frontal impact, side impact, and child safety. He has been a member of many committees of the Japanese government and academies involved in the advancement of national safety policies. He was elected a Fellow of the Japanese Society of Automotive Engineers in 2008 in part for his significant involvement in motor vehicle safety activities. He joined Japan's National Traffic Safety and Environment Laboratory (NTSEL) in 1978. Until his death in April of this year he worked at NTSEL in various positions - as a senior researcher, as chief of the Vehicle Structure Section, and as a principal researcher. In his distinguished career, he had made significant contributions to the development of Japanese safety test procedures. His work and his involvement in many national and international committees has brought about significant improvements in vehicle safety in Japan and elsewhere. He has also been the chair of the informal working group for revising the ECE R-94; and had participated in the Passive Safety Subcommittee, in the EEVC working group 13. His most significant efforts have been his service to the Japanese motoring public. He was involved in the development of test facilities at the NTSEL as a certification authority as well as in the establishment of the Japanese frontal impact regulation in 1994. The results from his studies of occupant protection in

## ESV 2011 Awards Recipients

side collisions have been highly valued and cited internationally. He developed a scoring system for side impact tests of the Japan New Car Assessment Program (JNCAP) and recently for curtain side air bag tests in JNCAP. He has also published many technical papers in international journals and a faithful contributor at ESV Conferences.

In recognition of his distinguished career for over 30 years, his outstanding contributions to vehicle safety through extensive research, his invaluable work with JNCAP and his work in the international arena, Mr. Yonezawa is recognized posthumously with the Award for Safety Engineering Excellence.



### **Wassim G. Najm**

**Advanced Vehicle Technology Division, Volpe Center,  
RITA, U.S. DOT  
United States**

Dr. Wassim G. Najm is Chief of the Advanced Vehicle Technology Division at the U.S. Department of Transportation's Volpe National Transportation Systems Center. Since joining the Volpe Center in 1999, Dr. Najm has published several technical papers and reports, and made many technical presentations at various national meetings. In addition to numerous group achievement awards and individual achievement awards within the U.S. DOT, Dr. Najm was selected as a finalist in the Technical Employee of the Year award by the Greater Boston Federal Executive Board in 2007.

Dr. Najm's contributions to automobile safety are too numerous to cite here. He has worked closely with the National Highway Traffic Safety Administration (NHTSA) safety engineers from the very beginning of his career. Dr. Najm's research results are used by many global automobile manufacturers who have participated in the Crash Avoidance Metrics Partnership program. The benefit estimates produced by Dr. Najm have provided a basis to inform and guide automobile industry and NHTSA decisions relative to the introduction of crash avoidance technologies into the marketplace. Likewise, his technical support to NHTSA has provided a statistically solid technical foundation for the agency's policy decisions directed at safety improvement. Dr. Najm successfully managed and contributed key technical work for two of NHTSA's major multi-year projects funded through the Intelligent Transportation Systems Program Office. These projects involve the field

testing and evaluation of integrated vehicle-based safety systems and intersection violation warning systems—technologies that could make important contributions to NHTSA and U.S. DOT goals related to highway safety. Dr. Najm is widely recognized for his pioneering contributions in enhancing crash safety analysis through the combination of statistical and safety engineering analysis principles. The taxonomy of pre-crash situations and corresponding crash types developed by Dr. Najm provides a uniform framework that is referenced and used by traffic safety researchers to assess and compare alternative crash avoidance concepts and technologies on a comparable basis.

In recognition of his pioneering contributions and outstanding achievements in the field of vehicle safety, the development of engineering-based methodologies to estimate the safety benefits of future advanced automotive crash avoidance systems, Dr. Najm is recognized with the Award for Safety Engineering Excellence.

# Plenary Session Monday, June 13

1:00 p.m. – 3:00 p.m. | Woodrow Wilson Ballroom A

## The Next Frontier in Advancing Global Safety

This year’s conference plenary session has five distinguished panelists representing a cross section of global safety organizations. The ambitious theme of the session will challenge each panelist to give his or her vision for advancing global safety from the perspective of the government, the consumer, or the industry. Numerous barriers exist in terms of ensuring advanced technology is introduced in the world-wide vehicle fleet and challenges of improved fuel efficiency, global vehicle markets, increased numbers of older vehicle occupants and a multitude of other issues confront policy as well as auto makers in the future. The panelists will offer insight into their recommendations on how best to fulfill their visions and to face the issues in the effort to promote vehicle safety in the future.

Moderator



**Mr. Daniel C. Smith**

Senior Associate Administrator Vehicle Safety  
National Highway Traffic Safety Administration  
**United States**

Panelists



**The Honorable Deborah A.P. Hersman**

Chairman, National Transportation Safety Board  
**United States**



**Mr. Ryosuke Itazake**

Director, International Affairs  
Ministry of Land Infrastructure and Transport  
**Japan**



**Dr. Michiel van Ratingen**

Secretary General Euro New Car Assessment  
Program, NCAP  
**Belgium**



**The Honorable David L. Strickland**

Administrator, National Highway Traffic Safety  
Administration  
**United States**



**Mr. David Ward**

Director General, FIA Foundation  
for the Automobile and Society  
**United Kingdom**

# Oral Presentations Tuesday, June 14

## Track A Morning

Tuesday, June 14 | 9:00 a.m.–12:30 p.m. | Annapolis 1 & 2

## Biomechanics #1: Crash Injury Analysis: Test and Computer Methods

**Chairperson** Stephen Ridella, United States

**Co-Chair** Philippe Vezin, France

**Paper No.11-0129-0**

**New Challenge of Integrating an Accident Research System with  
the Medical and Engineering Network in Japan**

**Susumu Ejima**, Shinichi Takayama, Koji Mikami, Koshiro Ono  
*Japan Automobile Research Institute, Japan*

Kunihiro Mashiko, Yuuichi Motomura  
*Nippon Medical School Chiba Hokusoh Hospital, Japan*

Hideyuki Ohashi  
*Institute for Traffic Accident Research and Data Analysis, Japan*

**Paper No.11-0089-0**

**How Reliable Are Injury Risk Curves?**

**Norbert Praxl**

*PDB—Partnership for Dummy Technology and Biomechanics, Germany*

**Paper No.11-0157-0**

**Anthropomorphic Test Dummy Lumbar Load Variation**

**Joseph Pelletiere**, David Moorcroft  
*Federal Aviation Administration, United States*

Gerardo Olivares  
*National Institute for Aviation Research, United States*

**Paper No.11-0369-0**

**A Sled Test Method for Small Overlap Crashes  
and Fatal Head Injuries**

**Ola Bostrom**, Dion Kruse  
*Autoliv Research, Sweden*

**Paper No.11-0263-0**

**Kinematic Rotational Brain Injury Criterion (BRIC)**

**Erik G. Takhounts**, Stephen A. Ridella  
*National Highway Traffic Safety Administration, United States*

Vikas Hasija  
*Bowhead Systems Management, Inc, United States*

Steve Rowson, Stefan M. Duma  
*Virginia Tech, United States*

# Oral Presentations Tuesday, June 14

**Paper No.11-0035-0**  
**Development of a Probabilistic Skull Fracture Model for a 50th Percentile Adult Male Motorcyclist ATD Headform**

**R. Michael Van Auken**, Terry Smith, John Zellner  
*Dynamic Research Inc., United States*

**Paper No.11-0043-0**  
**Research of Collision Speed Dependency of Pedestrian Head and Chest Injuries using Human FE Model (THUMS Version 4)**

**Ryosuke Watanabe**, Hiroshi Miyazaki, Yuichi Kitagawa, Tsuyoshi Yasuki  
*Toyota Motor Corporation, Japan*

**Paper No.11-0330-0**  
**Development of Injury Criteria For Frontal Impact Using A Human Body FE Model**

**Eric Song**, Erwan Lecuyer, Xavier Trosseille  
*LAB Peugeot Citroën Renault, France*

**Paper No.11-0256-0**  
**Analytical and Experimental Data of Chest Deflections and Injuries in Side Impacts**

**Narayan Yoganandan**, Frank A. Pintar, John R. Humm, Jason J. Hallman, Dennis J. Maiman  
*Neurosurgery, Medical College of Wisconsin, United States*

**Paper No.11-0317-0**  
**Image Segmentation and Registration Algorithm to Collect Homologous Landmarks for Age-Related Thoracic Morphometric Analysis**

**Ashley Weaver**, Elizabeth Armstrong, Elizabeth Moody, Joel Stitzel  
*Virginia Tech-Wake Forest University Center for Injury Biomechanics  
Wake Forest University School of Medicine, United States*

**Paper No.11-0195-0**  
**Multi-Scale Biomechanical Characterization of Human Liver and Spleen**

**Andrew Kemper**, Anthony Santago, Jessica Sparks, Craig Thor, H. Clay Gabler, Joel Stitzel, Stefan M. Duma  
*Virginia Tech - Wake Forest, Center for Injury Biomechanics, United States*

**Paper No.11-0193-0**  
**Effects of Pre-Impact Bracing on Chest Compression of Human Occupants in Low Speed Frontal Sled Tests**

**Andrew Kemper**, Stephanie Beeman, Stefan Duma  
*Virginia Tech - Wake Forest, Center for Injury Biomechanics, United States*

**Paper No.11-0150-0**  
**Investigation of Pre-Impact Bracing Effects for Injury Outcome Using Active Human FE Model With 3D Geometry of Muscles**

**Masami Iwamoto**, Yuko Nakahira, Takahiko Sugiyama  
*Toyota Central R&D Labs., Inc., Japan*

**Paper No.11-0154-0**  
**Implementation of Reactive Human Behavior in a Numerical Human Body Model using Controlled Beam Elements as Muscle Element Substitutes**

**Adrian Prügler**, Philipp Huber, Andreas Rieser, Kurt Steiner  
*Virtual Vehicle Research and Test Center, Austria*

**Stefan Kirschbichler**  
*Graz University of Technology, Vehicle Safety Institute, Austria*

**Arno Eichberger**  
*Graz University of Technology, Institute of Automotive Engineering, Austria*

---

## Track B Morning

Tuesday, June 14 | 9:00 a.m.–12:30 p.m. | Woodrow Wilson A

## Side Impact and Rollover Crashes: Prevention and Occupant Protection

**Chairperson** Bernd Lorenz, Germany  
**Co-Chair** Riley Garrott, United States

---

**Paper No.11-0072-0**  
**Development of a Side Impact Sled Test Method Using Multiple Actuators**

**Tomosaburo Okabe**, Akira Kinoshita, Naoki Shigeno, Hiroshi Kuniyuki  
*Nissan Motor Co, Ltd., Japan*  
**Hermann Steffan**  
*Dr. Steffan Datentechnik Ges.m.b.H, Austria*

**Paper No.11-0082-0**  
**Side Impact Safety: Assessment of High Speed Advanced European Mobile Deformable Barrier (AE-MDB) Test and WorldSID With ‘Ribeye’**

**Mervyn Edwards**, David Hynd, Jolyon Carroll, Alex Thompson  
*Transport Research Laboratory (TRL), United Kingdom*

**Paper No.11-0115-0**  
**Side Impact Air Bag Efficacy, Injury Mitigation Performance in Vehicle Models with and Without Side Impact Air Bags and Inflatable Head Protection**

**Robert C. Lange**, Nathan Soderborg, Harry Pearce, Karen Balavich, Su Wei Huang  
*Exponent, United States*

# Oral Presentations Tuesday, June 14

**Paper No.11-0133-0**  
**An Assessment of WorldSid 50th Percentile Male Injury Responses to Oblique and Perpendicular Pole Side Impacts**

**Thomas Belcher**, Mark Terrell  
*Australian Government Department of Infrastructure and Transport, Australia*  
**Suzanne Tylko**  
*Transport Canada, Canada*

**Paper No.11-0173-0**  
**A Study of Curtain Airbag Design Factors for Enhancement of Ejection Mitigation Performance**

**Eung-Seo Kim**, Dae-Young Kwak, Hyeong-Ho Choi, Han-Il Bae  
*Hyundai Motor Company, Korea*  
**Seung-Hui Yang**, Seung-Man Kim, Dong-Jun Lee  
*Autoliv, Korea*  
**Kwang-Soo Cho**  
*Hyundai Mobis, Korea*

**Paper No.11-0200-0**  
**Update on Investigation of New Side Impact Test Procedures in Japan**

**Hideki Yonezawa**, **Naruyuki Hosokawa**, Yoshinori Tanaka, Yasuhiro Matsui  
*National Traffic Safety and Environment Laboratory, Japan*  
**Takeshi Korenori**, Kiyohiko Hirakawa  
*Ministry of Land, Infrastructure and Transport, Japan*  
**Koji Mizuno**  
*Nagoya University, Japan*

**Paper No.11-0245-0**  
**Effectiveness and Estimation of the Likely Benefits of Side Impact Airbags in Passenger Vehicles in Victoria**

**Michael Fitzharris**, Stuart Newstead  
*Accident Research Centre, Monash University, Australia*  
**Samantha Cockfield**, Jessica Truong, Michael Nieuwesteeg, John Thompson  
*Transport Accident Commission, Australia*

**Paper No.11-0271-0**  
**Vehicle Greenhouse Shape Analysis for Design of a Parametric Test Buck for Dynamic Rollover Testing**

**Patrick Foltz**, Taewung Kim, Jason R. Kerrigan, Jeff R. Crandall  
*Center for Applied Biomechanics, University of Virginia, United States*

**Paper No.11-0304-0**  
**Update of NHTSA's 2007 Analysis of ESC Effectiveness**

**Robert Sivinski**  
*National Highway Traffic Safety Administration, United States*

**Paper No.11-0319-0**  
**Effect of Side Impact Protection in Reducing Injuries**

**Helena Stigson**  
*Folksam Research, Sweden*  
**Anders Kullgren**  
*Department of Applied Mechanics, Vehicle Safety Division, Chalmers University of Technology, Sweden*

**Paper No.11-0344-0**  
**Protecting Occupants in Rollover Crashes: Case Examples and Latest Technologies**

**Byron Bloch**  
*Auto Safety Design, United States*

**Paper No.11-0368-0**  
**A Study of Occupant Ejection Mitigation**

**Jeffery Dix**, Koichi Sagawa, Lalitkumar Sahare  
*Nissan Technical Center North America, United States*  
**Selim Hammoud**, Alex Cardinali, Daniel Fulk  
*Nissan North America, United States*  
**Abe Mitchell**  
*Autoliv North America, United States*

---

## Track C Morning

Tuesday, June 14 | 9:00 a.m.–12:30 p.m. | Annapolis 3 & 4

### Assessment of Strategies for Integrated Improvements in Fuel Economy & Safety, Including Use of Alternate Fuels and Batteries

**Chairperson** Jac Wismans, The Netherlands  
**Co-Chair** Antonio Erario, Italy

---

**Paper No.11-0439-0**  
**Post-crash Fuel Leakage and Fire Safety Experiments for Hydrogen Vehicles**

**Barbara Hennessey**  
*National Highway Traffic Safety Administration, United States*  
**James Reuther**, Jeffrey John, Paul Shawcross, Gregory Kimmel  
*Battelle, United States*

**Paper No.11-0096-0**  
**Crash Safety of Hybrid- and Battery Electric Vehicles**

**Rainer Justen**, Rodolfo Schöneburg  
*Daimler AG, Mercedes Car Group, Germany*



# Oral Presentations Tuesday, June 14

**Paper No.11-0107-0**  
**Safety Precautions and Assessments for Crashes Involving Electric Vehicles**

**Michael Paine**, David Paine  
*Australasian New Car Assessment Program (NCAP), Australia*

James Ellway  
*Euro NCAP, Belgium*

Craig Newland  
*Australian Automobile Association, Australia*

Stuart Worden  
*New Zealand Land Transport, New Zealand*

**Paper No.11-0114-0**  
**Injury Mitigation Technology Applications and the Relationships to Vehicle Mass, Price and Fuel Economy**

**Robert Lange**, Eric Jacuzzi, Nathan Soderborg, Harry Pearce  
*Exponent, United States*

**Paper No.11-0302-0**  
**Crash Safety Aspects of HV Batteries for Vehicles**

**Lothar Wech**, Richard Richter  
*TÜV SÜD Automotive GmbH, Germany*

Rainer Justen, Rodolfo Schoeneburg  
*Daimler AG, Mercedes Car Group, Germany*

**Paper No.11-0128-0**  
**Technology Needs for Safe Electric Vehicles Solutions in 2030**

**Jac Wismans**, Else-Marie Malmek, Ragnar Larsson  
*Chalmers University of Technology/SAFER, Sweden*

Jan Welinder  
*SP Technical Research Institute of Sweden, Sweden*

Yngve Håland  
*Autoliv, Sweden*

Magnus Oldenbo  
*Swerea Sicomp, Sweden*

**Paper No.11-0346-0**  
**Mass Reduction Performance of PEV AND PHEV Vehicles**

**Doug Richman**, Michael Bull  
*The Aluminum Association, Aluminum Transportation Group (ATG), United States*

**Paper No.11-0269-0**  
**Lithium Ion Batteries For Hybrid And Electric Vehicles—Risks, Requirements And Solutions Out of the Crash Safety Point of View**

**Lars Hollmotz**, Markus Hackmann  
*P3 Ingenieurgesellschaft, Germany*

**Paper No.11-0303-0**  
**NHTSA Tire Rolling Resistance Test Development Project—Phase 2**

Larry Evans, John Harris, M. Kamel Salaani  
*Transportation Research Center Inc., United States*

**James MacIsaac**  
*National Highway Traffic Safety Administration, United States*

**Paper No.11-0146-0**  
**Research Issues In Eco-Safe Driving**

**Andry Rakotonirainy**, Narelle Haworth  
*Centre for Accident Research & Road Safety (CARRS-Q) Queensland University of Technology, Australia*

Guillaume Saint-Pierre, Patricia Delhomme  
*IFSTTAR, French Institute in Science and Technology of Transport, France*

**Paper No.11-0438-0**  
**Lithium-ion Based Rechargeable Energy Storage System (RESS) Safety Performance Measurement in Automotive Applications**

**Phillip Gorney**  
*National Highway Traffic Safety Administration, United States*

---

## Track A Afternoon

Tuesday, June 14 | 2:00 p.m.–5:30 p.m. | Annapolis 1 & 2

## Biomechanics #2: Development of Crash Test Dummies Related Instrumentation and Analysis Techniques

**Chairperson** Koshiro Ono, Japan  
**Co-Chair** Bruce Donnelly, United States

---

**Paper No.11-0373-0**  
**Evaluation of Seat Performance Criteria for Rear-End Impact Testing**

**Johan Davidsson**  
*Chalmers University of Technology, Sweden*

Anders Kullgren  
*Folksam Research and Chalmers University of Technology, Sweden*

**Paper No.11-0201-0**  
**Study on Impact Response (Injury Value) Variation Factors for BioRID-II Dummies**

**Taichi Nakajima**, Kunio Yamazaki, Koshiro Ono  
*Japan Automobile Research Institute (JARI), Japan*

Masahide Sawada  
*Japan Automobile Manufacturers Association (JAMA), Japan*

## Oral Presentations Tuesday, June 14

### Paper No.11-0080-0

#### Comparison of WorldSID and Cadaver Responses in Low-Speed and High-Speed Nearside Impact

**Jonathan Rupp**, Carl Miller, Matthew Reed, Kathleen Klinich, Lawrence Schneider  
*University of Michigan Transportation Research Institute, United States*

### Paper No.11-0397-0

#### Real World Older Occupant Crash Data and Sensitivity of THOR-NT and WorldSID Dummy Thoraces

**Heather Rhule**  
*National Highway Traffic Safety Administration, United States*  
Ann Mallory, Alena Hagedorn  
*Transportation Research Center Inc., United States*

### Paper No.11-0312-0

#### Modifications to Improve the Durability, Usability and Biofidelity of the THOR-NT Dummy

**Daniel Parent**, Stephen Ridella  
*National Highway Traffic Safety Administration, United States*

### Paper No.11-0234-0

#### THOR-NT: HIP Injury Potential in Narrow Offset and Oblique Frontal Crashes

**Peter Martin**, Mark Scarboro  
*National Highway Traffic Safety Administration, United States*

### Paper No.11-0341-0

#### Analysis of Thoracic Loading, Kinematics, and Injuries in Small Overlap Impacts: Field Data and Full-Scale Vehicle Tests with Dummies

**Narayan Yoganandan**, Jason Hallman, Dale Halloway, James Rinaldi, Frank Pintar  
*Department of Neurosurgery, Medical College of Wisconsin, United States*

### Paper No.11-0190-0

#### Evaluation of the Thoracic Deflection Measurement System 'Rib-eye' in the Hybrid III 50% in Frontal Sled Tests

**Andre Eggers**, Thorsten Adolph  
*Federal Highway Research Institute (BAST), Germany*

### Paper No.11-0313-0

#### Scaling Methods Applied to Thoracic Force Displacement Characteristics Derived from Cardiopulmonary Resuscitation

**Matthew Maltese**, Kristy Arbogast  
*The Children's Hospital of Philadelphia, United States*  
Zhenwen Wang  
*Humanetics Inc, United States*  
Matthew Craig  
*National Highway Traffic Safety Administration, United States*

### Paper No.11-0265-0

#### Measurement of Aortic Injuries in Lower Severity Near-Side Impacts

**Kennerly Digges**  
*George Washington University; University of Miami, William Lehman Injury Research Center, United States*

Jeffrey Augenstein  
*University of Miami Miller School of Medicine; William Lehman Injury Research Center, United States*

Warren Hardy  
*Wayne State University, Virginia Tech, United States*

John Cavanaugh  
*Wayne State University, United States*

Jessica Steps Jermakian  
*George Washington University, Insurance Institute for Highway Safety (IIHS), United States*

Cristina Echemendia  
*George Washington University, National Highway Traffic Safety Administration (NHTSA), United States*

Chirag Shah  
*Wayne State University, Humanetics Innovative Solutions, United States*

### Paper No.11-0394-0

#### Characterization of the Pediatric Chest and Abdomen using Three Post-Mortem Human Subjects

**Richard Kent**, Francisco Lopez-Valdes, John Lamp, Sabrina Lau, Daniel Parent, Jason Kerrigan, David Lessley, Robert Salzar  
*Center for Applied Biomechanics, University of Virginia, United States*

### Paper No.11-0218-0

#### Contribution to the Improvement of Crash Test Dummies in Order to Decrease Abdominal Injuries in Road Accidents

**Gaëtan Hanen**, Francois Bermond  
*Université de Lyon/IFSTTAR, France*

Sabine Compigne  
*Toyota Motor Europe NV/SA, Belgium*

Mitsutoshi Masuda  
*Toyota Motor Corporation, Japan*



# Oral Presentations Tuesday, June 14

## Track B Afternoon

Tuesday, June 14 | 2:00 p.m.–5:30 p.m. | Annapolis 3 & 4

### Assessment of Performance of Occupant Protection Systems for Children, Older Adults, and Other Vulnerable Occupants

**Chairperson** Bernie Frost, United Kingdom

**Co-Chair** David Adams, United Kingdom

**Paper No.11-0037-0**

**Injury Risk to Seat Belt Restrained Occupants: Effect of Age and Seat Row**

**Kristy Arbogast**, Caitlin Locey, Mark Zonfrillo  
*Center for Injury Research and Prevention, Children's Hospital of Philadelphia*  
  
**Michael Kallan**  
*Center for Clinical Epidemiology and Biostatistics, University of Pennsylvania, United States*

**Paper No.11-0053-0**

**Safety Performance Comparisons of Different Types of Child Seats in High Speed Impact Tests**

**Jia Hu**, Dazhi Wang, Michael Mellor, Guoqiang Chen, Dayong Wang, Zheng Li, Yongguang Wang, Xing Su, Jianyong Ma, Xiaodong Tang  
*SAIC Motor, China*

**Paper No.11-0066-0**

**Identification of Head Injury Mechanisms of a Child Occupant in a Child Restraint System Based on Side Impact Tests**

**Ryoichi Yoshida**, Hiroshi Okada, Mitsunori Nomura,  
**Matsuto Yokohashi**, Chikayo Fujii  
*Takata Corporation, Japan*  
  
**Koji Mizuno**  
*Nagoya University, Japan*  
  
**Hideki Yonezawa**, Yoshinori Tanaka, Naruyuki Hosokawa,  
**Yasuhiro Matsui**  
*National Traffic Safety and Environment Laboratory, Japan*

**Paper No.11-0118-0**

**The Cumulative Effect of Multiple Forms of Minor Incorrect Use in Forward Facing Child Restraints on Head Injury Risk**

**Anna Tai**  
*School of Aerospace, Mechanical and Mechatronic Engineering, University of Sydney, Australia*  
  
**Julie Brown**, Lynne E. Bilston  
*Neuroscience Research Australia, Faculty of Medicine, University of New South Wales, Australia*

**Paper No.11-0135-0**

**The Effect of Varied Seatbelt Anchorage Locations on Booster Seat Sash Guide Effectiveness**

**Alice McDougall**  
*Neuroscience Research Australia, School of Aerospace, Mechanical and Mechatronic Engineering, University of Sydney, Australia*  
  
**Julie Brown**, Benjamin Beck, **Lynne Bilston**  
*Neuroscience Research Australia, Faculty of Medicine, University of New South Wales, Australia*

**Paper No.11-0138-0**

**Applying Side Impact Cushion Technology To Child Restraint Systems**

**Farid Bendjellal**  
*Britax Childcare Group, Germany*  
  
**Godfrey Scicluna**  
*Britax Childcare Pty Ltd, Australia*  
  
**Richard Frank**, Michael Grohspietsch, Andy Whiteway  
*Britax Europe, Germany/United Kingdom*  
  
**William Flood**, Ron Marsilio  
*Britax Child Safety Inc., United States*

**Paper No.11-0225-0**

**The Importance of Age For Injury Severity Among Car Drivers And Pedestrians**

**Anders Kullgren**  
*Folksam Research/Chalmers University of Technology, Sweden*  
  
**Anders Lie**  
*Swedish Transport Administration/Karolinska Institutet, Sweden*  
  
**Johan Strandroth**, **Claes Tingvall**  
*Chalmers University of Technology/Swedish Transport Administration, Sweden*  
  
**Matteo Rizzi**  
*Vectura Consulting/Monash University Accident Research Centre, Australia*

**Paper No.11-0227-0**

**NHTSA's Evaluation of a Potential Child Side Impact Test Procedure**

**Lisa K. Sullivan**, Allison E. Loudon, Cristina G. Echemendia  
*National Highway Traffic Safety Administration, United States*

**Paper No.11-0257-0**

**Rear Seat Safety in Frontal to Side Impacts—Focusing on Occupants From 3yrs to Small Adults**

**Lotta Jakobsson**  
*Volvo Car Corporation/ Chalmers University of Technology, Sweden*  
  
**Katarina Bohman**  
*Autoliv Research/Karolinska Institutet, Sweden*  
  
**Marianne Andersson**  
*Saab Automobile/Chalmers University of Technology, Sweden*

# Oral Presentations Tuesday, June 14

Isabelle Stockman, Mats Svensson  
*Chalmers University of Technology, Sweden*

Ola Boström  
*Autoliv Research/Chalmers University of Technology, Sweden*

Henrik Svanberg  
*Saab Automobile, Sweden*

Maria Wimmerstedt  
*Volvo Car Corporation, Sweden*

Kristy B. Arbogast  
*Children's Hospital of Philadelphia, United States*

**Paper No.11-0383-0**  
**Child Frontal Impact Safety In Coaches**

**Luis Martínez,** Antonio García, Enrique Alcalá, Manuel Espantaleón  
*University Institute for Automobile Research, Polytechnic University of Madrid (UPM – INSIA), Spain*

**Paper No.11-0390-0**  
**Occupant Injuries in Frontal Crashes by Age, Weight and BMI**

**Jeffrey Augenstein,** Kennerly Digges  
*William Lehman Injury Research Center, University of Miami, United States*

George Bahouth, Xiao Cui  
*Impact Research Inc., United States*

Kazuo Higuchi, Tanji Hiromasa, Schuyler St. Lawrence  
*Takata Corporation, Japan*

**Paper No.11-0406-0**  
**Interactions of Rear facing Child Restraints with the Vehicle Interior During Frontal Crash Tests**

**Suzanne Tylko**  
*Transport Canada, Canada*

---

**Track C Afternoon**  
Tuesday, June 14 | 2:00 p.m.–5:30 p.m. | Woodrow Wilson A

**Advanced Technology #1: Safety Performance and Effectiveness of Driver Assistance Technologies, Test & Evaluation Procedures, and Benefits Assessment\***

**Chairperson** Ray Resendes, United States  
**Co-Chair** Anders Lie, Sweden

---

**Paper No.11-0061-0**  
**A Test Programme for Active Vehicle Safety - Detailed Discussion of the eVALUE Testing Protocols for Longitudinal Functionality**

**Micha Lesemann,** Adrian Zlocki  
*Institut für Kraftfahrzeuge, RWTH Aachen University, Germany*

Josep Maria Dalmau  
*Applus IDIADA Group, Spain*

Mauro Vesco  
*Centro Ricerche Fiat, Italy*

Mattias Hjort  
*Vehicle Dynamics, Tyre Friction Measurement, VTI, Sweden*

Lucia Isasi  
*Tecnalia Transport, Spain*

Henrik Eriksson, Jan Jacobson  
*SP Technical Research Institute of Sweden, Sweden*

Lars Nordström  
*Volvo Technology Corporation, Sweden*

Daniel Westhoff  
*SICK AG, Germany*

**Paper No.11-0155-0**  
**RCS-Tug Study: Benefit Potential Investigation of Traffic Safety Systems With Respect to Different Vehicle Categories**

**Arno Eichberger,** Rüdiger Rohm, Wolfgang Hirschberg  
*Graz University of Technology, Institute of Automotive Engineering, Austria*

Ernst Tomasch, Hermann Steffan  
*Graz University of Technology, Vehicle Safety Institute, Austria*

**Paper No.11-0158-0**  
**Safety Impact of an Integrated Crash Warning System Based on Field Test Data**

**Emily E. Nodine,** Andy H. Lam, Wassim G. Najm  
*Volpe National Transportation Systems Center, United States*

John J. Ference  
*National Highway Traffic Safety Administration (Retired), United States*

# Oral Presentations Tuesday, June 14

**Paper No.11-0260-0**

**Driver Acceptance and Behavioral Changes with an Integrated Warning System: Key Findings from the IVBSS FOT**

**David LeBlanc**, James Sayer, Shan Bao, Scott Bogard, Mary Lynn Buonarosa, Adam Blankespoor, Dillon Funkhouser  
*University of Michigan Transportation Research Institute, United States*

**Paper No.11-0208-0**

**Ecall System: French A Posteriori Efficiency Evaluation**

**Cyril Chauvel**

*LAB: Laboratory of accidentology, biomechanics and human behavior, France*

Cathylie Haviotte

*CEESAR: European Center of Safety and Risk Analysis, France*

**Paper No.11-0212-0**

**Benefit Assessment of Forward-Looking Safety Systems**

**Lars Hannawald**, Christian Erbsmehl, Henrik Liers,  
*Verkehrsunfallforschung an der TU Dresden GmbH, Germany*

**Paper No.11-0244-0**

**The Victorian Intelligent Speed Assist and Heavy Vehicles Trial: Analysis of Device Acceptability and Influence on Speed Choice**

**Michael Fitzharris**, Karen Stephan, Stuart Newstead  
*Accident Research Centre, Monash Injury Research Institute, Monash University, Australia*

Jessica Truong  
*Transport Accident Commission, Australia*

David Healy  
*Transport Accident Commission, Accident Research Centre, Monash Injury Research Institute, Monash University, Australia*

Greg Rowe  
*Consultant, Australia*

Samantha Collins  
*Transport Accident Commission, Australia*

**Paper No.11-0207-0**

**The Efficiency of PRE-SAFE® Systems in Pre-braked Frontal Collision Situations**

**Rodolfo Schoeneburg**, Karl-Heinz Baumann, Michael Fehring  
*DAIMLER AG, Mercedes-Benz Cars, Germany*

**Paper No.11-0292-0**

**Design and Evaluation of an Integrated Vehicle Safety System for Longitudinal Safety and Lateral Stability**

**Wanki Cho**, Hyundong Heo, Kyongsu Yi  
*School of Mechanical and Aerospace Engineering, Seoul National University, Korea*  
Seungwuk Moon  
*Hyundai Mobis Corporation, Korea*  
Chankyu Lee  
*Electronics R&D Center, Hyundai Motor Company, Korea*

**Paper No.11-0367-0**

**Safety Impact Methodology (SIM): Application and Results of the Advanced Crash Avoidance Technologies (ACAT) Program**

**James Funke**

*National Highway Traffic Safety Administration, United States*

Gowrishankar Srinivasan, Raja Ranganathan, August Burgett (Retired)  
*Bowhead Systems Management, United States*

**Paper No.11-0054-0**

**On the Use of Real-World Accident Data for Assessing the Effectiveness of Automotive Safety Features – Methodology, Timeline and Reliability**

**Jens-Peter Kreiss**

*Technische Universität Braunschweig, Germany*

Michael Stanzel, Robert Zobel  
*Volkswagen Group Research, Germany*

**Paper No.11-0067-0**

**A Generative Approach to Estimate Effects of Safety Systems for Rear-end Collisions using ASSTREET**

**Hiroshi Yasuda**, Akio Kozato  
*Toyota Central R & D Labs, Japan*

Shin Tanaka, Tsutomu Mochida  
*Toyota Motor Corporation, Japan*

Jun Tajima  
*Advanced Solutions Technology, Japan*

**Paper No.11-0187-0**

**Development of a Target Propulsion System for ASSESS**

Patrick Seiniger, Oliver Bartels, **Tobias Langner**, Marcus Wisch,  
*Bundesanstalt für Straßenwesen (Federal Highway Research Institute), Germany*

**Paper No.11-0242-0**

**Pre-Crash Scenario Framework for Crash Avoidance Systems Based on Vehicle-to-Vehicle Communications**

Wassim Najm, Samuel Toma  
*Volpe National Transportation Systems Center, United States*

**John Harding**

*National Highway Traffic Safety Administration, United States*

---

**\*Continuing Advanced Technology #1**  
**Track B | Wednesday, June 15**  
**10:45 a.m. -12:30 p.m. | Annapolis 2-3-4**

---

## Oral Presentations Wednesday, June 15

### Track A Morning

Wednesday, June 15 | 9:00 a.m.–12:30 p.m. | Annapolis 1

### The Student Safety Technology Design Competition

The Collegiate Student Safety Technology Design Competition gives young scholars from Asia-Pacific, Europe, and North America an exciting opportunity to design, build, and demonstrate a cost effective conceptual scale model of a vehicle safety technology.

Teams consisting of university level seniors and /or graduate students, guided by one faculty advisor, submitted a 300-word abstract related to one of the 14 global vehicle safety research priorities. The abstracts were reviewed by a panel of safety engineers representing leaders in the field of automotive/vehicle safety in each of the three geographical regions. A maximum of six teams from each region were invited to participate in the regional competition. At the regional competition the teams were required to design and build a scale model prototype of a vehicle safety technology. Each team also prepared a report of the design and corresponding presentation. A panel of safety experts visited each team's school in early 2011, evaluated the designs, and selected the team finalists.

The finalists' prototype devices are on display in the Exhibition Hall. Please see the exhibit listings on page 90 for the exact location of the competitors. Attendees are encouraged to review the displays and demonstrations. An international panel of judges, made up of vehicle safety engineering experts, will select one first-place winner and one runner up, both of whom will receive an award and recognition for their achievements during the Closing Ceremony.

The winners of the Student Safety Technology Design Competition will be announced during the Closing Ceremony on Thursday, June 16 from 12:30 p.m.–1:00 p.m.

### International Finalists

#### ASIA PACIFIC—JAPAN, REGION 1

**Regional Coordinator** Mr. Kazuro Iwata, JSAE, Japan

**College of Engineering, Nihon University**

*"Development of New Type Dummy with Ca<sup>2+</sup> Increase in Cell Injury"*

**Students** Tomohiro Yosizumi, Keita Kitamura

**Advisor** Tetsuya Nishimoto

#### ASIA PACIFIC—KOREA, REGION 1

**Regional Coordinator** Mr. Younghan Youn, KUT, Korea

**Korea University of Technology and Education/Seoul National University of Science and Technology**

*"Development of the Smart Whiplash Protectable Seating System on Non-Symmetrical Rear Impact Crashes"*

**Students** Jinwoo Kwak, Youngmin Kim

**Advisor** Younghan Youn

#### EUROPE—REGION 2

**Regional Coordinator** Dominique Cesari, INRETS, France

**Hochschule für Technik und Wirtschaft des Saarlandes (HT-WdS) University of Applied Sciences**

*"Investigation into the Application of an Active Bracing Device for Improved Vehicle Crash Compatibility"*

**Students** Jessica Bock, Sebastian Georg

**Advisor** Joerg Hoffmann

**Universidad Politécnica de Madrid (UPM Madrid, Spain)**

*"Child Restraint System with Pre-Tensioner and Load Limiter Functionality"*

**Students** Antonio Garcia Alvarez, Manuel Espantaleon Ruiz

**Advisor** Luis Martinez

#### NORTH AMERICA, REGION 3

**Regional Coordinator** Arthur Carter, NHTSA United States

**University of Central Florida (UCF)**

*"Driveid: Individualized Risk Mitigation for Diverse High-Risk Drivers"*

**Students** Ben Sawyer, Grave Teo

**Advisor** Mustapha Mouloua, PhD

**University of Michigan Transportation Institute (UMTRI)**

*"The Design and Testing of a Low-Cost Child Restraint for use In Developing Countries"*

**Students** Megan Bland, Rachel Strauss

**Advisor** Matthew P. Reed, Ph.D.

**Virginia Polytechnic Institute and State University (VT)—Wake Forest University (WFU) Center for Injury Biomechanics**

*"Deflection Measurement System for the Hybrid III Six-Year-Old Biofidelic Abdomen"*

**Students** T. Stanley Gregory, Meghan K. Howes

**Advisor** Warren N. Hardy, PhD

# Oral Presentations Wednesday, June 15

## Track B Morning

Wednesday, June 15 | 9:00 a.m.–10:30 p.m. | Annapolis 2-3-4

## Panel Discussion Vehicle Safety: Regulatory Compliance & Enforcement and Defects Investigation

**Chairperson** Claude Harris, United States

### Motor Vehicle Recall Management in China

**Lequn Dong**

Department of Law Enforcement and Supervision, General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China (AQSIQ), China

### Activities and legislative background of the European Commission with relevance to enforcement of automotive-related legislation

**Giacomo Mattinò**

DG Enterprise and Industry, Automotive Industry Unit, European Commission

### The Automotive Recall System in Japan

**Kenji Sato**

Ministry of Land, Infrastructure, Transport and Tourism (MLIT), Japan

### Overview of the Defects Investigations System in Korea

**Yun-Seog Hong**, Hae-Boung Hwon

Division of Vehicle Regulation Research, Korea Automobile Testing & Research Institute (KATRI), Korea

### Assessment of an Electronic throttle Control System for Unintended Acceleration

Michael T. Kirsch, Victoria A. Regenie, Oscar Gonzalez, Michael L. Aguilar, Robert C. Scully, Cynthia H. Null, Mitchell Davis  
National Aeronautics and Space Administration (NASA) Engineering Safety Center (NESC), United States

**Michael Bay**

Bay Engineering Innovations, Inc., United States

Bill Collins, Gregory Magno, Arthur Carter, Jeff Quandt, Scott Yon, Daniel Smith, John Maddox, Brian Smith, **Roger Saul**  
National Highway Traffic Safety Administration, United States

**Robert Kichak**

MEI Technologies, Inc., United States

### Sensitivity of Tolerance Limits on Motorcycle Helmet Impact Attenuation Tests

**Charles Fleming**

National Highway Traffic Safety Administration, United States

### NHTSA's Enforcement program and Outreach Activities to the International Regulatory Enforcement Community

**Claude Harris**

National Highway Traffic Safety Administration, United States

## Track B Morning

Wednesday, June 15 | 10:45 a.m.–12:30 p.m. | Annapolis 2-3-4

## \*Continuing Advanced Technology #1: Safety Performance and Effectiveness of Driver Assistance Technologies, Test & Evaluation Procedures, and Benefits Assessment

**Chairperson** Ray Resendes, United States

**Co-Chair** Anders Lie, Sweden

### Paper No.11-0164-0

#### Car-to-Pedestrian Contact Situations in Near-Miss Incidents and Real-World Accidents in Japan

**Yasuhiro Matsui**, Kunio Takahashi, Ryoko Imaizumi, Kenichi Ando  
National Traffic Safety and Environment Laboratory (NTSEL), Japan

### Paper No.11-0350-0

#### Influence of Driver Assistance Systems on Repair Costs

**Helge Kiebach**

KTI GmbH & Co. KG, Germany

### Paper No.11-0352-0

#### Cars are Driven on Roads, Joint Visions and Modern Technologies Stress the Need for Co-Operation

**Anders Eugensson**, Jan Ivarsson

Volvo Car Corporation, Sweden

**Anders Lie**, Claes Tingvall

Swedish Transport Administration, Sweden

# Oral Presentations Wednesday, June 15

**Paper No.11-0360-0**

**Two Metrics of Night Vision System Performance**

**Kip Smith**

*Cognitive Engineering and Decision Making Inc., United States*

Jan-Erik Källhammer

*Autoliv Development AB, Sweden*

Matthias Oberländer, Werner Ritter, Roland Schweiger

*Daimler AG, Germany*

**Paper No.11-0301-0**

**Analysis and Validation of Perception Sensor Models in an Integrated Vehicle and Environment Simulation**

Erwin Roth, Tobias Dirndorfer, Alois Knoll

*Technische Universität München, Germany*

Kilian v. Neumann-Cosel

*Automotive Safety Technologies GmbH, Germany*

Thomas Ganslmeier, Andreas Kern

*Audi Electronics Venture GmbH, Germany*

Marc-Oliver Fischer

*Audi AG, Germany*

**Thomas Unselt**, Christian Mayer

*Daimler AG, Germany*

Estelle Chin

*PSA-Peugeot-Citroën, France*

Andrés Aparicio, Óscar Muñoz

*Applus IDIADA Group, Spain*

Maminirina Ranovona, Jun Tsuchida

*Toyota Motor Europe NV/SA, Belgium*

Bernhard Winkler

*Technische Universität Graz, Austria*

**Paper No.11-0121-0**

**Perceptual Risk Estimate (PRE): An Index of the Longitudinal Risk Estimate**

**Hirofumi Aoki**, Nguyen Van Quy Hung

*Toyota Motor Corporation, Japan*

Hiroshi Yasuda

*Toyota Central R&D Labs., Inc., Japan*

**PaperNo.11-0111-0**

**Emergency Steer & Brake Assist—A Systematic Approach for System Integration of Two Complementary Driver Assistance Systems**

**Alfred Eckert**, Bernd Hartmann, Martin Sevenich, Peter E. Rieth

*Continental AG, Germany*

**Paper No.11-0441-0**

**The Development of Equipment to Detect Alcohol in the Human Body**

**Toshiaki Sakurai**, Seira Oikawa

*Department of Mechanical Engineering, Iwaki Meisei University, Japan*

**PaperNo.11-0322-0**

**Using Vehicle-Based Sensors of Driver Behavior to Detect Alcohol Impairment**

**John Lee**

*University of Wisconsin-Madison, United States*

Timothy Brown

*University of Iowa, United States*

Dary Fiorentino

*Southern California Research Institute, United States*

James Fell

*Pacific Institute for Research & Evaluation*

Eric Traube

*National Highway Traffic Safety Administration, United States*

Eric Nadler

*Volpe Transportation Systems, United States*

---

## Track C Morning

Wednesday, June 15 | 9:00 a.m.–12:30 p.m. | Woodrow Wilson A

## Advanced Technology #2: Human Performance and Driver Behavior

**Chairperson** Tim Johnson, United States

**Co-Chair** Andre Seeck, Germany

---

**Paper No.11-0252-0**

**Crash Warning Interface Metrics: Evaluating Driver-Vehicle Interface Characteristics for Advanced Crash Warning Systems**

**Emanuel Robinson**, Neil Lerner, James Jenness

*Westat, United States*

Eric Traube

*National Highway Traffic Safety Administration, United States*

Timothy Brown

*University of Iowa, United States*

Carryl Baldwin

*George Mason University, United States*

Robert Llaneras

*Virginia Tech Transportation Institute, United States*

**Paper No.11-0284-0**

**Assessment of Behavioral Aspects In Integrated Safety Systems (EU FP7 Project ASSESS)**



# Oral Presentations Wednesday, June 15

**Paper No.11-0230-0**  
**Driver Alcohol Detection System for Safety (DADSS): Phase I Prototype Testing and Findings**

Susan A. Ferguson  
*Ferguson International LLC, United States*

Abdullatif Zaouk, Neeraj Dalal, Clair Strohl  
*QinetiQ North America, United States*

Eric Traube  
*National Highway Traffic Safety Administration, United States*

Robert Strassburger  
*Alliance of Automobile Manufacturers, United States*

**Paper No.11-0320-0**  
**Thinking About Distraction – A Conceptual Framework For Assessing Driver-Vehicle On-Road Performance In Relation To Secondary Task Activity**

Mikael Ljung Aust, Anders Eugensson, Jan Ivarsson, Mats Petersson  
*Volvo Cars Corporation, Sweden*

**Paper No.11-0258-0**  
**Influence of the Minimum Swerving Distance on the Development of Powered Two Wheeler Active Braking**

Federico Giovannini, Giovanni Savino, Marco Pierini  
*University of Florence, Italy*

**Paper No.11-0398-0**  
**Driver Assistance Systems in Oncoming Traffic Situations**

Helmut Schittenhelm  
*Daimler AG, Germany*

---

## Track A Afternoon

Wednesday, June 15 | 2:00 p.m.–5:30 p.m. | Annapolis 1 & 2

## Restraint System Design and Performance Challenges: Effects of Future Fleet Changes

**Chairperson** Stephen Summers, United States  
**Co-Chair** Lex Van Rooij, The Netherlands

---

**Paper No.11-0110-0**  
**Optimization of Restraint Systems of a Vehicle Architecture Using Meta Models**

Jan-Peter Druecker  
*Vehicle Safety Dept., BMW Group, Germany*

**Paper No.11-0199-0**  
**Development of Body Structure for Crash Safety of the Newly Developed Electric Vehicle**

Hayata Uwai, Atsushi Isoda, Hideaki Ichikawa, Nobuhiko Takahashi  
*Nissan Motor Co., Ltd., Japan*

**Paper No.11-0251-0**  
**Model-based Analysis of Sensor-Noise in Predictive Passive Safety Algorithms**

Tobias Dirndorfer, Alois Knoll  
*Robotics and Embedded Systems, Technische Universität München, Germany*

Michael Botsch  
*Department for Active and Passive Safety, AUDI AG, Ingolstadt, Germany*

**Paper No.11-0163-0**  
**Is the Driving-Wheel Airbag the Best Solution for Protecting the Driver in Frontal Impacts?**

Gustavo Zini  
*School of Engineering - University of Buenos Aires, Argentina*

**Paper No.11-0351-0**  
**Actual Restraint Systems: Reached Their Limits!? Analyses of Accident Data of Frontal Impacts, Compared to Consumer Test Results**

Volker Sandner, Thomas Unger  
*ADAC, Germany*

**Paper No.11-0281-0**  
**Method to Estimate the Field Effectiveness of an Automatic Braking System in Combination with an Adaptive Restraint System in Frontal Crashes**

Anja Ressler, Markus Lienkamp  
*Technische Universität München, (TU Munich), Germany*

Franz Fuerst  
*Audi AG, Germany*

**Paper No.11-0442-0**  
**Analysis of the Pre-Crash Benefit of Reversible Belt Pre-Tensioning in Different Accident Scenarios**

Mark Mages, Martin Seyffert, Uwe Class  
*TRW Automotive GmbH, Germany*

**Paper No.11-0296-0**  
**Investigation of Pre-Braking on Unbelted Occupant Position and Injuries using an Active Human Body Model (AHBM)**

Christophe Bastien, Mike Blundell  
*Coventry University, United Kingdom*

Clive Neal-Sturgess  
*University of Birmingham, United Kingdom*

Robin Van Der Made  
*TNO Automotive Safety Solutions (TASS), The Netherlands*

# Oral Presentations Wednesday, June 15

**Paper No.11-0306-0**  
**Effect of Various Pre-Crash Braking Strategies on Simulated Human Kinematic Response with Varying Levels of Driver Attention**

**Lex van Rooij**  
*TNO, The Netherlands*

**Paper No.11-0318-0**  
**Presentation and Discussion of a Crash Test Using a Car with Autonomous Pre-Crash-Braking**

Alexander Berg, **Peter Rücker**  
*DEKRA Automobil GmbH, Germany*  
  
Christian Domsch  
*BMW AG, Germany*

**Paper No.11-0381-0**  
**Standard & Integrated Restraint First Row Seat Performance in Rear-Impact Crashes**

**Nicholas Mango**, Elizabeth Garthe  
*Garthe Associates, United States*

**Paper No.11-0408-0**  
**Seat Headrest Development to Detect the Head Position of Passenger**

**Su Hwan Hwang**, Eun Sue Kim, Gil Joo Kim, Bong Jun Lee  
*Hyundai Motors, South Korea*

**Paper No.11-0278-0**  
**Reducing Neck Injuries by Controlling Seat Back Dynamic Movement**

**Dongwoo Jeong**, GilJoo Kim, Bongjun Lee  
*Seat System Design Engineering Team, Hyundai Motor Company, South Korea*  
  
Johan Svard, Peter Axelsson  
*Sweden Autoliv Safety Center/Autoliv, Sweden*

---

## Track B Afternoon

Wednesday, June 15 | 2:00 p.m.–5:30 p.m. | Annapolis 3 & 4

## Advancements in Pedestrian and Other Vulnerable Non-Occupant Road User-Safety

**Chairperson** Rikard Fredriksson, Sweden  
**Co-Chair** Robert Anderson, Australia

---

**Paper No.11-0079-0**  
**Improved Assessment Methods of Lower Extremity Injuries in Vehicle-to-Pedestrian Accidents using Impactor Tests and Full-Scale Dummy Tests**

**Oliver Zander**  
*Federal Highway Research Institute (BAST), Germany*  
  
Dirk-Uwe Gehring, Peter Leßmann  
*BGS Boehme & Gehring GmbH, Germany*

**Paper No.11-0328-0**  
**The Flexible Pedestrian Legform Impactor and its Impact on Vehicle Design**

Thomas Kinsky, Flavio Friesen, Benjamin Buenger, **Brian Latouf**  
*Adam Opel AG/General Motors Europe Engineering, Germany*

**Paper No.11-0137-0**  
**Review of the Euro NCAP Upper Leg Test**

**Nils Lubbe**  
*Toyota Motor Europe, Belgium*  
  
Hiromi Hikichi, Hiroyuki Takahashi  
*Toyota Motor Corporation, Japan*  
  
Johan Davidsson  
*Chalmers University of Technology, Sweden*

**Paper No.11-0119-0**  
**Injury Risk Assessment at the Timing of Pedestrian Impact with a Road Surface in a Car-Pedestrian Accident**

**Kenji Anata**, Atsuhiko Konosu, Takahiro Issiki  
*Japan Automobile Research Institute (JARI), Japan*

**Paper No.11-0277-0**  
**Validation of Pedestrian Sedan Buck using Human Finite Element Model**

**Shunji Suzuki**, Yukou Takahashi, Masayoshi Okamoto  
*Honda R&D Co., Ltd., Japan*  
  
Rikard Fredriksson  
*Autoliv Research, Sweden*  
  
Shinsuke Oda  
*Autoliv Japan Ltd., Japan*

**Paper No.11-0432-0**  
**Pedestrian Protection—Physical and Numerical Analysis of the Protection Offered by the Windscreen**

**Christian Pinecki**, Laurent Fontaine, Celine Adalian, Clément Jeanneau, Richard Zeitouni  
*PSA Peugeot Citroën, France*

**Paper No.11-0355-0**  
**Accidents Between Pedestrians and Industrial Vehicles: From Injury Patterns to Dummy and Truck Prototypes**

**Philippe Beillas**, Mario Mero, Steve Belon, Alain Maupas  
*IFSTTAR, Université de Lyon, France*



# Oral Presentations Wednesday, June 15

Hervé Desfontaines, Philippe Deloffre  
*Renault Trucks SAS – Volvo 3P, France*

Pierre-Yves Lapauw, Laurent Huet  
*Segula Technologies Sud, BU-CALCUL, R&I, France*

Sébastien Charnaux  
*Plastic Omnium Auto Extérieur, Research and Innovation, France*

**Paper No.11-0094-0**  
**Holland: VRU Paradise Goes for the Next Safety Level**

Margriet van Schijndel - de Nooij, **Stefanie de Hair-Buijssen**,  
Ton Versmissen  
*TNO, The Netherlands*

Rikard Fredriksson, Erik Rosén, Jan Olsson  
*Autoliv Research, Sweden*

**Paper No.11-0097-0**  
**Development of Nissan Approaching Vehicle Sound for Pedestrians**

**Toshiyuki Tabata**  
*Vehicle Performance Engineering Department, Nissan Motor Company Ltd., Japan*

Tsuyoshi Kanuma  
*Performance Development Department, Nissan Motor Company Ltd., Japan*

Heather Konet  
*Nissan Technical Center North America, Inc., United States*

**Paper No.11-0188-0**  
**The Correlation Between Pedestrian Injury Severity In Real-Life Crashes And Euro NCAP Pedestrian Test Results**

**Johan Strandroth**, Claes Tingvall  
*Swedish Transport Administration and Chalmers University of Technology, Sweden*

Matteo Rizzi  
*Vectura Consulting and Monash University Accident Research Centre, Australia*

Simon Sternlund  
*Swedish Transport Administration, Sweden*

Anders Lie  
*Swedish Transport Administration and Karolinska Institutet, Department for Public Health Science, Sweden*

**Paper No.11-0300-0**  
**Benefit Estimation of Secondary Safety Measures in Real-World Pedestrian Accidents**

**Henrik Liers**, Lars Hannawald  
*Verkehrsunfallforschung an der TU Dresden GmbH (VUFO), Germany*

**Paper No.11-0217-0**  
**Bio-Inspired Neuromorphic Identification of Pedestrian and Object for the Road User Safety**

**Woo Joon Han**, Il Song Han  
*Korea Advanced Institute of Science and Technology (KAIST), Korea*

**Paper No.11-0196-0**  
**Typical Pedestrian Accident Scenarios for the Testing of Autonomous Emergency Braking Systems**

**James Lenard**, Russell Danton  
*Loughborough University, United Kingdom*

Matthew Avery, Alix Weekes  
*Thatcham, United Kingdom*

David Zubry  
*Insurance Institute for Highway Safety, United States*

Matthias Kühn  
*German Insurers Accident Research, Germany*

**Paper No.11-0057-0**  
**Assessment of Active and Passive Technical Measures for Pedestrian Protection at the Vehicle Front**

**Michael Hamacher**  
*fka - Forschungsgesellschaft Kraftfahrwesen mbH Aachen, Germany*

Lutz Eckstein  
*ika - Institut für Kraftfahrzeuge RWTH Aachen University, Germany*

Matthias Kühn, Thomas Hummel  
*German Insurers Accident Research, Germany*

---

## Track C Afternoon

Wednesday, June 15 | 2:00 p.m.–5:30 p.m. | Woodrow Wilson A

## NCAP and Other Non-Regulatory Strategies for Improving Safety

**Chairperson** Mark Terrell, Australia  
**Co-Chair** Jenny Dang, United States

---

**Paper No.11-0075-0**  
**Beyond NCAP: Promoting New Advancements in Safety**

**Michiel van Ratingen**, Aled Williams  
*Euro NCAP, Belgium*

Erwin Segers  
*Honda Motor Europe, Belgium*

Pierre Castaing  
*UTAC, France*

Anders Lie  
*Swedish Transport Administration, Sweden*

Bernie Frost  
*Department for Transport, United Kingdom*

# Oral Presentations Wednesday, June 15

Volker Sandner  
*ADAC, Germany*  
Raimondo Sferco  
*Ford Motor Company, Germany*  
Christoph Weimer  
*Hyundai Motor Europe, Germany*  
*On behalf of the Euro NCAP Beyond NCAP Group*

**Paper No.11-0088-0**  
**Installation Patterns for Emerging Injury Mitigation Technologies, 1998 through 2010**

**Robert Lange**, Harry Pearce, Eric Jacuzzi  
*Exponent, United States*

**Paper No.11-0091-0**  
**Application of ANCAP Star Ratings to Variants of Vehicle Models**

**Jack Haley**  
*NRMA Motoring and Services, Australia*  
Michael Paine  
*Australasian New Car Assessment Program, Australia*  
David Paine  
*Vehicle Design and Research P/L, Australia*

**Paper No.11-0275-0**  
**Assessment of 12 Years KNCAP Performances and a Plan for Elderly Occupant Protections**

**Younghan Youn**, Wan-Hee Han  
*Korea University of Technology and Education, Korea*  
Gyu-Hyun Kim  
*Korea Automotive Testing and Research Institute, Korea*  
Hyung-Jung Kim, Jung-Kyu Park  
*Ministry of Land, Transport and Maritime Affairs, Korea*

**Paper No.11-0165-0**  
**IIHS Side Crash Test Ratings and Occupant Death Risk in Real-World Crashes**

**Eric R.Teoh**, Adrian K.Lund  
*Insurance Institute for Highway Safety, United States*

**Paper No.11-0235-0**  
**Comparison of BioRID Injury Criteria between Dynamic Sled Tests and Vehicle Crash Tests**

**David A. Aylor**, David S. Zuby  
*Insurance Institute for Highway Safety, United States*

**Paper No.11-0343-0**  
**NHTSA's Test Procedure Evaluations for Small Overlap/Oblique Crashes**

**James Saunders**, Matthew J Craig.  
*National Highway Traffic Safety Administration, United States*  
Jeffrey Suway  
*Alpha Technology Associate, Inc., United States*

**Paper No.11-0403-0**  
**Definition of a Methodology to Define a Risk Index for Motorcyclists According to Their Exposure**

Mario Nombela, Eduard Infantes  
*Applus+ IDIADA, Spain*

**Paper No.11-0405-0**  
**The Development of A Dynamic Rollover Rating Test**

**Donald Friedman**, Garrett Mattos  
*Center for Injury Research, United States*  
Jacqueline Paver  
*Consultant, United States*

**Paper No.11-0178-0**  
**Evaluation of the Car Safety Enhancements During the Last Three Decades**

Stéphane Mogodin, **Nicolas Bertholon**  
*LAB/ PSA Peugeot-Citroën / Renault, France*  
Sophie Cuny, Marie-Christine Simon  
*Centre Européen d'Études de Sécurité et d'Analyse des Risques (CEESAR), France*

**Paper No.11-0175-0**  
**Improving the Safety Performance of Australian Vehicles – A Consumer Focused Approach**

**Samantha Cockfield**, John Thompson, Jessica Truong  
*Transport Accident Commission (TAC), Australia*

**Paper No.11-0134-0**  
**How Useful are the Two Child Dummies in the Rear Seat of NCAP Testing?**

**Lynne Bilston**, Ben Beck, Alice McDougall, Julie Brown  
*Neuroscience Research Australia, University of New South Wales, Australia*

**Paper No.11-0445-0**  
**Rear Occupant Protection JNCAP Test – Test Results & Findings**

**Takaaki Yamasaki**, Kouichi Uesaka  
*National Agency for Automobile Safety and Victims' Aid (NASVA), Japan*

### Track A Morning

Thursday, June 16 | 9:00 a.m.–12:30 p.m. | Woodrow Wilson A

## Vehicle Structural Design Changes: Implications for Frontal Impact Protection and Compatibility

**Chairperson** Bernie Frost, United Kingdom

**Co-Chair** Suzanne Tylko, Canada

#### Paper No.11-0209-0

##### Self-Protection and Partner-Protection for New Vehicles—UNECE R94 Amendment

Cyril Chauvel, Gerard Faverjon, Nicolas Bertholon  
*Laboratory of Accidentology, Biomechanics and Human Behavior, Peugeot Citroën Renault, France*

Sophie Cuny  
*European Center of Safety Studies and Risk Analysis, CEESAR, France*

#### Pascal Delannoy

*Safran Engineering, SAFRAN Group—UTAC Passive Safety Department, France*

#### Paper No.11-0295-0

##### Priorities for the Assessment of Frontal Impact Compatibility

#### Sean O'Brien

*Volkswagen AG, Germany*

#### Paper No.11-0286-0

##### FIMCAR—Frontal Impact And Compatibility Assessment Research: Strategy and First Results for Future Frontal Impact Assessment

#### Heiko Johannsen

*Automotive Engineering, Technische Universität Berlin, Germany*

#### Thorsten Adolph

*Passive Vehicle Safety and Biomechanics, Bundesanstalt für Straßenwesen, Germany*

#### Robert Thomson

*VTI, Sweden*

#### Mervyn Edwards

*TRL, United Kingdom*

#### Ignacio Lázaro

*APPLUS IDIADA, Spain*

#### Ton Versmissen

*TNO, The Netherlands*

#### Paper No.11-0335-0

##### Accuracy of AHOF400 with Moment-Measuring Load Cell Barrier

**Sanjay Patel**, Stephen Summers, Aloke Prasad

*National Highway Traffic Safety Administration, United States*

Pradeep Mohan

*The George Washington University, United States*

John Brewer

*U.S. Department of Transportation, Volpe National Transportation Systems Center, United States*

#### Paper No.11-0283-0

##### Use of Secondary Energy Absorbing Structures for Improved Self Protection Performance—Experiences During the Development of a Chassis Based Vehicle

Ganesh Gadekar, **Anil Kumar Chigullapalli**, Ashok G. Joshi,  
Makarand Takle

*Tata Technologies Ltd.*

#### Paper No.11-0073-0

##### Front and Side Car-to-Car CAE Based Crash Analysis of Different Class Vehicles

#### Jangho Shin

*Advanced Safety CAE Team, Hyundai Motor Company, Korea*

Haeng Kyeom Kim, Yun Chang Kim

*Platform Development Team, Hyundai Motor Company, Korea*

#### Paper No.11-0430-0

##### Progressive Deformable Barrier (PDB—Evaluation of Its Impact on Small Car Designs Through CAE Analysis

Pratap Daphal, **Anil Kumar Chigullapalli**

*Tata Technologies Ltd.*

#### Paper No.11-0435-0

##### Frontal Impact Improvements—Enhanced Modelling of the Impact Barrier

**Loïc Grall**, Richard Zeitouni, Céline Adalian

*PSA Peugeot Citroën, France*

#### Paper No.11-0384-0

##### Injury Analysis of Real-World Small Overlap and Oblique Frontal Crashes

**Rodney W. Rudd**, Mark Scarboro, James Saunders

*National Highway Traffic Safety Administration, United States*

#### Paper No.11-0372-0

##### Frontal Crashes Between the Longitudinal Rails

**Paul Scullion**, Richard Morgan, Kennerly Digges,

Cing-Dao (Steve) Kan

*George Washington University—National Crash Analysis Center, United States*

# Oral Presentations Thursday, June 16

**Paper No.11-0239-0**  
**Improving the Crash Compatibility of Cars and Roadside Poles**  
**Michael Griffiths**  
*Road Safety Solutions, Australia*  
John Jarvie  
*Accountable Safe Innovations, Australia*

**Paper No.11-0074-0**  
**Crash Test Performance of Large Truck Rear Underride Guards**  
**Matthew Brumbelow**  
*Insurance Institute for Highway Safety, United States*

**Paper No.11-0288-0**  
**Analysis of Compatibility and Occupant Injury Mechanisms in Frontal Collisions Involving Buses in Spain**  
Francisco Javier Páez Ayuso, Arturo Furones Crespo, Alexandro Ba-dea Romero, Enrique Alcalá Fazio, Francisco Aparicio Izquierdo  
*University Institute for Automobile Research (INSIA)—Technical University of Madrid (UPM), Spain*

---

## Track B Morning

Thursday, June 16 | 9:00 a.m.–10:30 p.m. | Annapolis 1 & 2

### Advances in Driver Assistance Systems for Heavy Trucks and Buses & All Aspects of Motorcycle Safety

**Chairperson** Devin Elsasser, United States  
**Co-Chair** Younghan Youn, Korea

---

**Paper No.11-0153-0**  
**Advanced Driver Assistance Systems for Trucks – Benefit Estimation from Real-Life Accidents**  
**Matthias Kuehn**, Thomas Hummel, Jenoe Bende  
*German Insurers Accident Research, Germany*

**Paper No.11-0169-0**  
**Vehicle Safety Communications for Commercial Vehicles: Issues Affecting Deployment of Vehicle to Vehicle Communications for Heavy Vehicles**  
**Alrik Svenson**  
*National Highway Traffic Safety Administration, United States*  
Jonathan Mueller  
*Federal Motor Carrier Safety Administration, United States*

**Paper No.11-0290-0**  
**Development and Evaluations of Advanced Emergency Braking System Algorithm for the Commercial Vehicle**  
**Taeyoung Lee**, Kyongsu Yi  
*School of Mechanical and Aerospace Engineering, Seoul National University, Korea*  
Jangseop Kim  
*Research & Development Division, Hyundai-Kia Motors, Korea*  
Jaewan Lee  
*Korea Automobile Testing & Research Institute, Korea Transportation Safety Authority, Korea*

**Paper No.11-0443-0**  
**Driver Performance with a Camera/Video Imaging System**  
**Paul Rau**  
*National Highway Traffic Safety Administration, United States*  
Gregory Fitch, Myra Blanco, Richard J. Hanowski, Matthew C. Camden  
*Virginia Tech Transportation Institute (VTTI), United States*

**Paper No.11-0070-0**  
**MoLife—Hazard Detection in a Cooperative Assistance System for Motorcycles**  
Benedikt Lattke, Frank Sperber, Tobias Müller, Hermann Winner  
*Technische Universität Darmstadt, Institute of Automotive Engineering, Germany*  
Richard Eberlein, Rainer Hoffmann  
*Carhs Communication GmbH, Germany*

**Paper No.11-0156-0**  
**Modeling of Indirect Visibility**  
Krzysztof Olejnik, Jerzy W. Kownacki  
*Motor Transport Institute, Poland*

**Paper No.11-0109-0**  
**Conspicuity of Powered-Two-Wheelers**  
Rainer Krautscheid, Nadine Müller, Jost Gail  
*Bundesanstalt für Straßenwesen (BAST; Federal Highway Research Institute), Germany*

**Paper No.11-0191-0**  
**The Potential of Different Countermeasures in Reducing Motorcycle Fatal Crashes: What In-Depth Studies Tell Us**  
**Matteo Rizzi**  
*Vectura Consulting and Monash University Accident Research Centre, Sweden*  
Johan Strandroth  
*Swedish Transport Administration and Chalmers University of Technology, Sweden*  
Roger Johansson  
*Swedish Transport Administration, Sweden*  
Anders Lie  
*Swedish Transport Administration and Karolinska Institutet, Sweden*

# Oral Presentations Thursday, June 16

**Paper No.11-0123-0**  
**Advanced Rider Assistance Systems for Powered Two-Wheelers (ARAS-PTW)**

Achim Kuschefski, Matthias Haasper, André Vallese  
*Institut für Zweiradsicherheit e.V. (ifz), Germany*

---

## Track C Morning

Thursday, June 16 | 9:00 a.m.–12:30 p.m. | Annapolis 3 & 4

## Assessments of New and Improved Field Data Collection & Analysis Methods

**Chairperson** Andre Seeck, Germany  
**Co-Chair** Augustus (Chip) Chidester, United States

---

**Paper No.11-0042-0**  
**Incident Detection Based on Vehicle CAN-Data Within the Large Scale Field Operational Test “Eurofot”**

Mohamed Benmimoun, Felix Fahrenkrog, Adrian Zlocki,  
Lutz Eckstein  
*Institut für Kraftfahrzeuge, RWTH Aachen University, Germany*

**Paper No.11-0215-0**  
**Bridging Laboratory and Field Studies**

Jan-Erik Källhammer  
*Autoliv Development, Sweden*  
Kip Smith  
*Cognitive Engineering and Decision Making, Inc., United States*

**Paper No.11-0168-0**  
**A Study of NMVCCS to Identify Critical Pre-Crash Factors in Fatal Crashes**

Mark Mynatt, James Bean, Charles J. Kahane, Carla Rush, Eric Traube, Chris Wiacek  
*National Highway Traffic Safety Administration, United States*

**Paper No.11-0144-0**  
**Field Study on Crash Causal Factors of Chassis Modifications**

Fabian Regh, Hermann Winner  
*Institute of Automotive Engineering; Technische Universität Darmstadt (TUD), Germany*  
Rainer Krautscheid  
*Active Vehicle Safety, Emissions, Energy; Federal Highway Research Institute (BAST), Germany*

**Paper No.11-0192-0**  
**New Findings on the Usage of Logistic Regression in Accident Data Analysis**

Jens-Peter Kreiss  
*Technische Universität Braunschweig, Germany*  
Tobias Zangmeister  
*Fraunhofer ITWM, Kaiserslautern, Germany*

**Paper No.11-0338-0**  
**Use of Car Crashes Resulting in Injuries to Identify System Weaknesses**

Helena Stigson  
*Folksam Research, Stockholm, Sweden*  
Anders Kullgren  
*Folksam Research, Stockholm, Sweden and Department of Applied Mechanics, Vehicle Safety Division, Chalmers University of Technology, Göteborg, Sweden*  
Maria Krafft  
*Folksam Research, Stockholm, and Department of Surgical and Perioperative Sciences, Umeå University, Umeå, Sweden*

**Paper No.11-0389-0**  
**Evaluation of WinSmash Accuracy in NHTSA Side Crash Test Reconstructions**

Nicholas Johnson, Hampton C Gabler  
*Virginia Tech, United States*

**Paper No.11-0282-0**  
**Development of ACNS in Korea**

Hyung Yun Choi  
*Hongik University, Mechanical System Design Engineering Department, Korea*  
Il Song Han  
*Korea Advanced Institute of Science and Technology, Korea*  
Jae Wan Lee, Jae Kon Shin  
*Korea Automobile Testing & Research Institute, Korea*

**Paper No.11-0326-0**  
**Predicting Occupant Outcomes with EDR Data**

Matthew Craig, Mark Scarboro, Stephen Ridella  
*National Highway Traffic Safety Administration, United States*

**Paper No.11-0315-0**  
**Post Collision Vehicle Fire Analysis**

Markus Egelhaaf  
*DEKRA Automobil GmbH, Germany*  
Dieter Wolpert  
*DEKRA Automobil GmbH, Germany*

## Oral Presentations Thursday, June 16

### Paper No.11-0100-O

#### Creation of an In-Depth Road Traffic Crash Database for India: Coimbatore Rural District Case Study

Jeya Padmanaban, **Greg Stadter**  
*JP Research, Inc., United States*

Ravishankar Rajaraman, Swastik Narayan, Bharat Ramesh  
*JP Research India, Pvt. Ltd., India*

### Paper No.11-0228-O

#### An Analysis of Improvements to Vehicle Safety and Their Contribution to Recent Declines in Fatalities and Injury Rates

**Donna Glassbrenner**  
*National Highway Traffic Safety Administration, United States*

### Paper No.11-0202-O

#### Safety of Light Goods Vehicles—Findings From The German Joint Project of BAST, DEKRA, UDV and VDA

**Matthias Kuehn**, Jenoe Bende  
*German Insurers Accident Research, Germany*

Raimondo Sferco, Roland Schaefer  
*Ford Motor Company Europe, Germany*

Andreas Georgi  
*BOSCH, Germany*

Walter Niewoehner  
*DEKRA Technology Center, Germany*

Andreas Schepers, Claus-Henry Pastor  
*Federal Highway Research Institute, Germany*

Joachim Scheerer  
*Daimler, Germany*

## Written Papers

---

## Biomechanics #1: Crash Injury Analysis: Test and Computer Methods

---

### Paper No.11-0399-W

#### 11-0399 Subdural Hematoma and Aging: Crash Characteristics and Associated Injuries

Ann Mallory, Rod Herriott  
*Transportation Research Center Inc., United States*  
Heather Rhule  
*National Highway Traffic Safety Administration, United States*

### Paper No.11-0216-W

#### Assessment of Dummy Models by using Objective Rating Methods

Christian Gehre  
*PDB—Partnership for Dummy Technology and Biomechanics, Germany*  
Sebastian Stahlschmidt  
*DYNAmore GmbH, Germany*

### Paper No.11-0038-W

#### Characterization of the Pediatric Shoulder's Resistance to Lateral Loading Conditions

Brian Suntay  
*Transportation Research Center Inc., United States*  
Kevin Moorhouse  
*National Highway Traffic Safety Administration, United States*  
John Bolte IV  
*The Ohio State University, United States*

### Paper No.11-0162-W

#### Detailed Analysis of 3D Occupant Kinematics and Muscle Activity during the Pre-Crash Phase as Basis for Human Modeling Based on Sled Tests

Stefan Kirschbichler, Wolfgang Sinz  
*Graz University of Technology, Vehicle Safety Institute, Austria*  
Adrian Prügler, Philipp Huber, Kurt Steiner  
*Virtual Vehicle Research and Test Center, Austria*

### Paper No.11-0031-W

#### Development of a Finite Element Pam-Crash Model of Hybrid III Anthropomorphic Test Device with High Fidelity

Xinghua Lai, Qing Zhou, Zhe Lin  
*State Key Laboratory of Automotive Safety and Energy, Department of Automotive Engineering, Tsinghua University, China*  
Yongning Wang, Pierre Culiére  
*ESI Group, France*

**Paper No.11-0009-W**

**Development of an Advanced Finite Element Model for a Pedestrian Pelvis**

Miwako Ikeda, Shunji Suzuki, Yasuaki Gunji, Yukou Takahashi  
*Honda R&D Co.,Ltd. Automobile R&D Center, Japan*

Yasuki Motozawa, Masahito Hitosugi  
*Dokkyo Medical University School of Medicine, Japan*

**Paper No.11-0428-W**

**Dynamic properties of Shoulder Complex Bones**

Sudipto, Mukherjee, Anoop, Chawla, Saurabh, Borouah, Debashish, Sahoo, Mike W. J. Arun  
*Department of Mechanical Engineering, IIT Delhi, India*

Girish, Sharma, Parthiv Shah, Christophe Ageorges  
*Mercedes Benz R&D India, India*

**Paper No.11-0366-W**

**Evaluation of Biofidelity of ECE Regulation No. 22 Injury Criteria**

Paul Rigby, Brett Juhas, Jessica Wong, Philemon Chan  
*L-3/Jaycor, United States*

**Paper No.11-0331-W**

**Evaluation of Statistical methods for Generating Injury Risk Curves**

Vikas Hasija  
*Bowhead Systems Management, Inc, United States*

Erik G. Takhounts, Stephen A. Ridella  
*National Highway Traffic Safety Administration, United States*

**Paper No.11-0422-W**

**Optimization of Vehicle Front for Safety of Pedestrians**

Hariharan Sankarasubramanian, Sudipto Mukherjee, Anoop Chawla  
*Indian Institute of Technology, Delhi, India.*

**Paper No.11-0414-W**

**The Clarification of Individual Injury Mechanism Difference in Pedestrian FE Model Utilizing Cadaver Scaling and Posturing Techniques**

Shinichi Takayama, Yoshihiro Yamamoto, Susumu Ejima, Koshiro Ono  
*Japan Automobile Research Institute*

Koichi Kamiji, Tsuyoshi Yasuki  
*Japan Automobile Manufacturers Association*

---

**Side Impact and Rollover Crashes: Prevention and Occupant Protection**

---

**Paper No.11-0213-W**

**NHTSA's Research on Improved Restraints in Rollovers**

Allison E. Loudon  
*National Highway Traffic Safety Administration, United States*

Doug Weston  
*Transportation Research Center, Inc., United States*

**Paper No.11-0310-W**

**Crash-Test Results to Analyze the Impact of Non-Professional Repair on the Performance of Side Structure of a Car**

Uwe Schmortte  
*KTI GmbH & Co. KG, Germany*

**Paper No.11-0358-W**

**Deployment Characteristics of Seat Mounted Side Impact Airbags**

Karen Balavich, Nathan Soderborg, Robert Lange, Harry Pearce  
*Exponent, United States*

**Paper No.11-0090-W**

**Predicting and Verifying Dynamic Occupant Protection**

Donald Friedman, Diego Rico, Garrett Mattos  
*Center for Injury Research, United States*

Dr. Jacqueline Paver, Ph.D.  
*Consultant, United States*

**Paper No.11-0116-W**

**Rollover Injury Science and Rollover Crash Typology**

Robert Lange, Madhu Iyer, Harry Pearce, Eric Jacuzzi, Jeffery Croteau  
*Exponent, United States*

**Paper No.11-0105-W**

**Safety and Vision Improvements by Expandable A-Pillars**

Pipkorn Bengt  
*Autoliv Research, Sweden*

Lundström Jesper  
*Saab Automobile, Sweden*

Ericsson Mattias  
*Epsilon, Sweden*



# Written Papers

**Paper No.11-0065-W**  
**Side-by-Side Utility and Recreational Vehicles—A Safety Analysis**

H. Alex Roberts, P.E.  
*The Engineering Institute, United States*

Micky Gilbert, P.E.  
*Gilbert Engineering, United States*

---

## Assessment of Strategies for Integrated Improvements in Fuel Economy and Safety, Including Use of Alternate Fuels and Batteries

---

**Paper No.11-0412-W**  
**A Study of Fuel System Integrity and Electric Safety of HFCV**

Kwang-Bum Lee, Jae-Wan Lee, Jong-Soo Kim, Gee-Joong Yong  
*Korea Automobile Testing and Research Institute, Republic of Korea*

**Paper No.11-0117-W**  
**Considerations Regarding Electric and Hybrid Vehicle Safety**

Donald Parker, Celina Miolajczak, Robert Lange  
*Exponent Inc., United States*

**Paper No.11-0167-W**  
**Why Should Aluminum Continue to Replace Steel in Cars? An LCA (Lyfe Cycle Assessment) Comparison**

Gustavo Zini  
*School of Engineering—University of Buenos Aires, Argentina*

---

## Biomechanics #2: Development of Crash Test Dummies Related Instrumentation and Analysis Techniques

---

**Paper No.11-0334-W**  
**Evaluation of the Hybrid III 5th Female Modified Chest Jacket & Spine Box**

Joseph D. McFadden  
*National Highway Traffic Safety Administration, United States*

James L. Stricklin  
*Transportation Research Center, Inc. (TRC), United States*

**Paper No.11-0374-W**  
**EvaRID—Anthropometric and Biomechanical Specification of a Finite Element Dummy Model of an Average Female for Rear Impact Testing**

Astrid Linder  
*Swedish National Road and Transport Research Institute, VTI, Sweden*

Mats Svensson, Anna Carlsson  
*Chalmers University, Sweden*

Paul Lemmen, Fred Chang  
*Humanetics, Germany*

Kai-Uwe Schmitt  
*AGU, Switzerland*

Anders Kullgren  
*Folksam Research/Chalmers University, Sweden*

**Paper No.11-0221-W**  
**Traffic Accident Analysis Towards the Development of an Advanced Frontal Crash Test Dummy Indispensable for Further Improving Vehicle Occupant Protection Performance**

Masayuki Yaguchi, Yuichi Omoda, Koshiro Ono  
*Japan Automobile Research Institute, Japan*

Mitsutoshi Masuda, Kazuhiro Onda  
*Japan Automobile Manufacturers Association, Inc., Japan*

---

## Assessment of Performance of Occupant Protection Systems for Children, Older Adults, and Other Vulnerable Occupants

---

**Paper No.11-0205-W**  
**Advanced Occupant Detection System: Detection of Human Vital Signs by Seat-Embedded Ferroelectric Film Sensors and by Vibration Analysis**

Pierre Orlewski  
*CRP Gabriel Lippmann, country*

Laurent Federspiel  
*IEE SA, Luxemburg*

Mark Cuddihy, Manoharprasad Rao  
*Ford Motor Company, United States*

Stephen Fuks  
*IEE Sensing Inc., United States*

**Paper No.11-0142-W**  
**Analysis of Child Dummy Responses and CRS Performance in Frontal NCAP Tests**

Chung-Kyu (CK) Park, Richard M. Morgan, Kennerly H. Digges  
*National Crash Analysis Center (NCAC), The George Washington University, United States*

**Paper No.11-0246-W**  
**Evaluation of an Improved Performance Anti-Submarining Seat Belt System**

Tom Gibson, Amy Clarke  
*Human Impact Engineering, Australia*



# Written Papers

Lui Pisaniello, Marcel Stephan, Lino Fusco  
*Lifebelt, Australia*  
Robert Judd  
*Autoliv, Australia*

**Paper No.11-0113-W**  
**Innovative Bonnet Active Actuator (B2A) for Pedestrian Protection**  
Evrard Borg  
*SNPE Matériaux Energétiques, France*

**Paper No.11-0348-W**  
**NHTSA's Rear Seat Safety Research**  
Aloke Prasad  
*National Highway Traffic Safety Administration, United States*  
Doug Weston  
*Transportation Research Center Inc., United States*

**Paper No.11-0380-W**  
**Real World Analysis of Rear Seat Occupant Safety in Frontal Crashes**  
Christopher Wiacek, Rodney Rudd  
*National Highway Traffic Safety Administration, United States*  
Lauren Collins  
*Alpha Technology Associates, Inc., United States*

**Paper No.11-0345-W**  
**Development of a Test Tool to Analyze Airbag Induced Injuries**  
Arturo, Dávila, Mario, Nombela  
*IDIADA Automotive Technology SA, Spain*

**Paper No.11-0291-W**  
**Update on Lateral Impact Test Procedure for Child Restraint Systems**  
Heiko Johannsen  
*Technische Universität, Germany*  
Farid Bendjellal  
*Britax Childcare Group, Germany*  
François Renaudin  
*Dorel Europe, France*  
Peter Claeson  
*SIS Swedish Standards Institute, Sweden*

---

## Advanced Technology #1: Safety Performance Effectiveness of Driver Assistance Technologies, Test & Evaluation Procedures, and Benefits Assessment

---

**Paper No.11-0311-W**  
**Development Plan for Assessment Technology of Advanced Safety Vehicle**  
Jae-Wan Lee, Gyu-Hyun Kim  
*Korea Automobile Testing and Research Institute, Korea*  
Byeong-Kee Han  
*Hongik University, Korea*  
Yun-Yeong Jo  
*Ministry of Land, Transportation and Maritime Affairs, Korea*

**Paper No.11-0147-W**  
**LDWS Performance Study Based on Human Factors**  
Hong Guk Lee, Hwan Seo, Park, Song Min, Yoo  
*Kyung Hee University, Korea*

**Paper No.11-0401-W**  
**One Size Doesn't Fit All**  
Donald Friedman  
*Center for Injury Research, United States*

**Paper No.11-0364-W**  
**Potential Effectiveness of Integrated Forward Collision Warning, Pre-Collision Brake Assist, and Automated Pre-Collision Braking Systems in Real-world, Rear-End Collisions**  
Kristofer Kusano, Hampton Gabler  
*Virginia Polytechnic Institute and State University, United States*

**Paper No.11-0270-W**  
**Progress Report on Evaluation of a Pre-Production Head-on Crash Avoidance Assist System using an Extended "Safety Impact Methodology" (SIM)**  
Michael Van Auken, John Zellner, Jordan Silberling  
*Dynamic Research Inc., United States*  
Yoichi Sugimoto, Yoshihiro Urai  
*Honda R&D Company, Ltd, Japan*

**Paper No.11-0393-W**  
**Proposal for a Test Procedure of Assistance Systems regarding Preventive Pedestrian Protection**  
Walter Niewöhner  
*DEKRA Automobil GmbH, Accident Research, Stuttgart, Germany*  
Franz Roth  
*Audi AG, Germany*

# Written Papers

Johann Gwehenberger  
*Allianz Center for Technology, Germany*  
Christian-Michael Gruber  
*BMW Group, Germany*

Matthias Kuehn  
*German Insurers Accident Research, Germany*

Raimondo Sferco  
*Ford Motor Company Europe, Germany*

Claus-Henry Pastor  
*Federal Highway Research Institute, no country*

Uwe Nagel  
*Daimler AG, Germany*

Michael Stanzel  
*Volkswagen AG, Germany*

## Restraint System Design and Performance Challenges: Effects of Future Fleet Changes

**Paper No.11-0151-W**  
**Enhanced Seat Belt Modeling Process to Improve Predictive Accuracy of Dummy Response in Frontal Impact**

Tom Voigt, Werner Schrenk, Harald Zellmer  
*Autoliv B.V. & Co. KG, Germany*

**Paper No.11-0354-W**  
**Heavy Truck Occupant Restraint System - New Approved Concepts and Development Methods**

Frank Wollny, André Buchholz  
*Takata-Petri AG, Germany*

**Paper No.11-0098-W**  
**Optimization of Seat Belt Buckle Motion for Reducing Chest Deflection, Using Rib Eye Sensors**

Burkhard Eickhoff, Werner Schrenk, Harald Zellmer  
*Autoliv B.V. & Co. KG, Germany*

Martin Meywerk  
*Helmut-Schmidt-University, Germany*

**Paper No.11-0262-W**  
**Study on Steering Column Collapse Analysis Using Detailed FE Model**

Tae Hee Lee, Byung Ryul Ham, Seong Oh Hong  
*Advanced Safety CAE Team, Hyundai Motor Company, Korea*

## Advancements in Pedestrian and Other Vulnerable Non-Occupant Road User-Safety

**Paper No.11-0424-W**  
**Evaluation of Usefulness and Repeatability for Pedestrian Protection Flex-PLI**

Yong-Won YOON, Gyu-Hyun KIM  
*Korea Automobile Testing and Research Institute, Korea*  
Jae-Moon LIM  
*Department of CAD & Graphics, Daeduk University, Korea*  
Gyung-Jin PARK  
*Department of Mechanical Engineering, Hanyang University, Korea*

**Paper No.11-0237-W**  
**A New Advancement in Pedestrian Safety: Finite Element (FE) Modeling of the FLEX-PLI GTR**

Chirag Shah, Wen-Ren Harn, Hong Zhou, Christian Kleessen, Fuchun Zhu, Robert Kant  
*Humanetics Innovative Solutions, Inc., United States*

**Paper No.11-0014-W**  
**A Simplified Model of Pedestrian Upper Legform Impact for Estimate of Energy-Absorption Space Underneath Bonnet Lead**

Bingbing Nie, Yong Xia, Jun Huang, Qing Zhou  
*State Key Laboratory of Automotive Safety and Energy, Tsinghua University, China*

**Paper No.11-0219-W**  
**Car Bonnet Evaluation Against Pedestrian Head Impact Based on a Lumped Modeling Approach**

Nicolas Bourdet, Caroline Deck, Rémy Willinger  
*IMFS, University of Strasbourg, France*

**Paper No.11-0429-W**  
**Dynamic Properties of Human Cancellous Bones**

Sudipto Mukherjee, Anoop Chawla, Kartik Marwah, Lucky Grover, Joel Keishing  
*Mechanical Engineering, Indian Institute of Technology Delhi, India*

**Paper No.11-0177-W**  
**Impactor Development for the Assessment of Active Pedestrian Protection Systems**

Edmund Marx, Werner Bieck, Thierry Mousel  
*IEE S.A, Luxembourg*

# Written Papers

**Paper No.11-0108-W**  
**Safety Requirements for Small Motorized Alternative Vehicles**

Michael Paine  
*Vehicle Design and Research Pty Ltd, Australia*

---

## NCAP and Other Non-Regulatory Strategies for Improving Safety

---

**Paper No.11-0131-W**  
**A Proposal for Rear Seat Head Restraint Geometric Ratings**

Matthew Avery, Alix Weekes, David Brookes  
*Thatcham, United Kingdom*

**Paper No.11-0203-W**  
**An Insight into Multiple Impact Crash Statistics to Search for Future Directions of Counter-Approaches**

Atsushi Togawa, Daisuke Murakami, Hidetsugu Saeki, Chinmoy Pal, Tomosaburo Okabe  
*Nissan Motor Company, Japan*

**Paper No.11-0106-W**  
**Encouraging Safer Vehicles Through Enhancements to the NCAP Rating System**

Michael Paine, David Paine  
*Australasian New Car Assessment Program, Australia*  
  
Craig Newland  
*Australian Automobile Association, Australia*  
  
Stuart Worden  
*New Zealand Land Transport, New Zealand*

**Paper No.11-0298-W**  
**Increasing the Uptake of Key Vehicle Safety Features—A Consumer Focused Approach**

John Thompson, Samantha Cockfield, Jessica Truong  
*Transport Accident Commission, Australia*

**Paper No.11-0402-W**  
**Relationship between Pedestrian Protection Test Protocols and a Real Scenario**

Mario Nombela, Eloi Boix  
*Applus+ IDIADA, Spain*

**Paper No.11-0440-W**  
**The Newly Enhanced U.S. NCAP: A First Look at Model Year 2011 Ratings**

Brian Park  
*National Highway Traffic Safety Administration*  
  
Lauren A. Collins, Taryn E. Rockwell, Christina S. Smith  
*Alpha Technology Associate, Inc., United States*

---

## Assessments of New and Improved Field Data Collection & Analysis Methods

---

**Paper No.11-0101-W**  
**Analysis of the Rescue Operations of Injured Vehicle Occupants by Fire Fighters**

Yoshihiro Sukegawa  
*Japan Automobile Research Institute (JARI), Japan*  
  
Masaaki Sekino  
*Japan Automobile Manufacturers Association, Inc. (JAMA), Japan*

**Paper No.11-0395-W**  
**Crash Pulse Data from Event Data Recorders in Rigid Barrier Tests**

Alan German, Dainius Dalmotas  
*D.J. Dalmotas Consulting, Inc., Canada*  
  
Jean-Louis Comeau  
*Transport Canada, Canada*

**Paper No.11-0170-W**  
**Drowning Deaths in Motor Vehicle Traffic Accidents**

Rory Austin  
*National Highway Traffic Safety Administration, United States*

**Paper No.11-0371-W**  
**Introduction and Initial Analysis of New Side Impact Variables Captured in NHTSA Crash Databases**

Mark Scarboro, Rodney Rudd  
*National Highway Traffic Safety Administration, United States*

**Paper No.11-0314-W**  
**Measurements of the Grip Level and the Water Film Depth for Real Accidents of The German in-Depth Accident Study (GIDAS)**

Florian Vogt  
*Verkehrsunfallforschung an der TU Dresden GmbH (VUFO), Germany*  
  
Pierre Fevri r  
*Tire Research (Michelin), France*

# Written Papers

**Paper No.11-0231-W**  
**Survival Analysis of Real-World Tire Aging Data**  
Jingshu Wu  
*National Highway Traffic Safety Administration, United States*

**Paper No.11-0385-W**  
**The “AIS-0” Conundrum: The Complexities of Identifying the Uninjured in NASS-CDS**  
Elizabeth Garthe, Nicholas Mango  
*Garthe Associates, United States*

**Paper No.11-0095-W**  
**Unintended Benefits of the National Motor Vehicle Crash Causation Study: A Highway Perspective**  
Ana Maria Eigen, Kenneth Opiela  
*Federal Highway Administration (FHWA), United States*



# Social Program

**Welcome Reception**  
**Price** Complimentary with registration fee  
(one ticket per registered attendee; guest price \$95.00)  
**Date** Monday, June 13  
**Time** 7:00 p.m. – 9:00 p.m.  
**Location** Orchard Terrace Lawn, National Harbor



**ESV Gala Dinner**  
**Price** \$175.00 per person  
**Date** Wednesday, June 15, 2011  
**Time** 7:00 p.m. – 11:00 p.m.  
**Location** The Sunset Room at National Harbor



The ESV Conference Organizers invite you to attend the Gala Dinner to take place at The Sunset Room at National Harbor. With its spectacular floor to ceiling windows and outdoor terraces wrapping the entire perimeter, the Sunset Room offers stunning panoramic views of the Potomac River and area historic landmarks. In this majestic atmosphere, guests will have the opportunity to indulge their senses with a menu of distinctive hors d'oeuvres, sumptuous entrees, and desserts while enjoying live entertainment and dancing to the smooth sounds of the Galaxy Band. This is a great opportunity to relax, make new international connections, and enjoy an unforgettable evening.

Technical Events

Vehicle Technology Ride and Drive

**Date** Tuesday, June 14 and Wednesday, June 15

**Time** 9:00 a.m. – 4:00 p.m.

**Location** Bus loop adjacent to side entrance of the Gaylord National Hotel

**Fee** Complimentary to all registered ESV participants on a first come, first served basis.



We are pleased to offer registered ESV participants an opportunity to view, ride and drive the latest in vehicle crash avoidance, vehicle communications and other advanced safety technologies that are being

developed by automotive manufactures and their suppliers.

Registered attendees can sign up for drives with the various manufacturers at their exhibit booths in the Prince George's Exhibition Hall. Vehicles will depart from the bus loop adjacent to the side entrance to the Gaylord National Hotel on level 2. Please see individual manufacturers at their booths for sign up times and other logistical details. A valid driver's license (any state or country license) is required to be able to drive the vehicles. Please join us for a technology filled event where you will see and experience state-of-the-art safety!

OEM/Supplier	Demo Description	Sign-Up at Booth
Audi/VW	Driver Assistance Systems; FCW,LDW, BSM	35
BMW	Pedestrian Detection; Urban Safety Assist	4
Bosch	Lane Departure Warning	27
Continental	City Safety- Forward Collision Avoidance	2
Ford	V2V Communications; Blind Spot Information System; MyKey; SYNC	5
Magna	Video Mirrors: Machine Rear Vision Technology	3
TRW	Lane Keeping Assist; Slip Control Boost	12

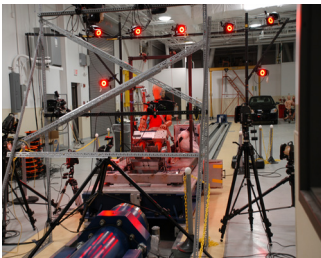
Technical Tour

Laboratory Tour and Crash Tests at the University of Virginia

**Date** Friday, June 17, 2011

**Time** 9:00 a.m. – 3:00 p.m.

**Fee** \$50.00 per person (limit 100 people)



We are pleased to offer an exciting technical tour showcasing a new laboratory located in the foothills of the Blue Ridge Mountains, about a two-hour drive from Washington, D.C.

The tour will visit the new laboratory of the University of Virginia Center for Applied

Biomechanics, a joint venture of the Schools of Engineering and Medicine and the largest university-based injury biomechanics laboratory in the world. The facility boasts several state-of-the-art pieces of equipment, as well as custom resources and capabilities that are unique to the laboratory. This includes specialized materials testing machines, a servo-controlled reverse-acceleration sled and a deceleration sled, a 16-camera high-speed motion capture system, and the world's first university-based full-scale rollover sled system, which is capable of rolling a sport-utility vehicle at 400-deg/s and dropping it onto a moving roadbed. The facility tour will include a sled test exhibition and a live rollover test.

Included with the tour is round-trip, air-conditioned, motorcoach transportation from the Gaylord National Hotel to the laboratory. A box lunch will be provided before leaving the lab. Please let us know if you have any food restrictions. We will make every effort to accommodate your request.

# General Conference Information

## Location

Just 10 minutes from downtown Washington, D.C., National Harbor is directly accessible from the Capital Beltway, I-95, I-495, I-295, and the new Woodrow Wilson Bridge, and is minutes away from all three area airports. There are interchange and multi-lane fly-off ramps exiting exclusively into the community from Maryland, Virginia, and D.C.

## Car Rental

There are many rental car companies to choose from for pickup at Dulles Airport, Reagan National Airport or Baltimore-Washington International Airport as well as several other locations throughout the Baltimore-DC area:

Alamo (800) 462-5266	Hertz (800) 654-3131
Avis (800) 331-1212	National (800) 227-7368
Budget (800) 527-0700	Thrifty (800) 367-2277
Dollar (800) 800-4000	Enterprise (800) 736-8222

## Daily Parking Rates at Gaylord National Harbor

- \$5.00 for first hour
- \$12.00 for 0-3 hours self parking
- \$19.00 per day self parking/overnight
- \$17.00 for 0-3 hours valet parking
- \$28.00 per day valet parking/overnight

## Bus Service

National Harbor and the Gaylord National Hotel are connected to the Washington Metropolitan Area Transit Authority (WMATA), or Metro system, via a limited-stop bus route.

## Public Transportation

The closest Metro stop to the Gaylord is King Street in Alexandria, VA which is located on the Blue line, about a three-mile drive from the hotel. For train and bus schedules, route maps and current pricing, please visit: <http://www.wmata.com/?source=GaylordNational>



## Amtrak Train

Union Station is located on the Metro Red Line at 50 Massachusetts Ave., NE, Washington, DC 20002. To make train reservations, contact Amtrak at 1-800-872-7245 or [www.amtrak.com](http://www.amtrak.com). For more information on Union Station, visit [www.unionstationdc.com](http://www.unionstationdc.com)

## Taxi

Estimated pricing from the following area airports to Gaylord National Harbor:

- Reagan National (DCA)—\$20
- Dulles (IAD)—\$55
- Baltimore Washington (BWI)—\$65

## SuperShuttle

Local Reservations: 1 (800) 660-8000  
TDD Reservations: (866) 472-4497

## Water Taxi Service

Potomac Riverboat Company operates a water taxi service that allows travelers to explore this historic region from the dynamic perspective of the Potomac River. For a complete schedule and to purchase your ticket online, please visit: [www.potomacriverboatco.com](http://www.potomacriverboatco.com).



# General Conference Information

Gaylord National Hotel & Convention Center  
201 Waterfront Street  
National Harbor, MD 20745





# General Conference Information

## Refund and Cancellation Policy for Social Programs

There are no refunds provided for cancellation of attendance at any of the social programs.

## Services for Persons with Disabilities

Gaylord National offers accommodations and devices specifically for guests with disabilities. Service animals are allowed for persons with disabilities. Designated parking areas for guests with disabilities are available. (Valid disability parking permit is required.) Signage and elevators throughout the property feature Braille. All interior and exterior public spaces are accessible to guests with disabilities. Accessible guest rooms are available and offer a variety of features to accommodate different disabilities. Guest room bathrooms include wider bathroom doors, roll-in showers, shower benches (available by request), hand-held shower heads, accessible vanities, and bathroom rails. Guest room communications include door chimes (available by request) and strobe-light fire alarms.

## Insurance and Liability

It is highly recommended that all participants have adequate travel and health insurance, as the organizers of the ESV Conference 2011 cannot accept any liability for accidents, illnesses or injuries that may occur at or during the conference.

## Currency / Credit Cards

The United States dollar is the official currency of the United States of America. The U.S. dollar is normally abbreviated as the dollar sign, \$, or as USD or US\$ to distinguish it from other dollar-denominated currencies and from others that use the \$ symbol. It is divided into 100 cents. Credit cards can be used for almost any purchases in the United States. Widely accepted credit cards in the U.S. are Visa, MasterCard, American Express and Discover.

## Banks

There are three Capital One (formerly Chevy Chase) ATM's located throughout the National Harbor. There is one generic ATM located in the Gaylord National Harbor hotel.

# The ESV Exhibition in Detail

## NHTSA

Booth 48

The Vehicle Safety Program at NHTSA is comprised of four interconnected offices that coordinate on the research, development, enforcement and data analysis of Federal Motor Vehicle Safety Standards, and on defect investigations and provide consumer-level safety information. At the heart of the vehicle safety effort are crash and other field-relevant data, collected from many sources, and analyzed by the National Center for Statistics and Analysis. The data guide strategic planning efforts and inform the agency's research activities. The Office of Vehicle Safety Research carries out short- and long-term research projects that provide the scientific basis for future rules and other research outputs; the Office of Rulemaking turns this information into actual standards and interfaces with the industry and public to clarify rules; the Office of Enforcement is charged with ensuring vehicles and equipment comply with the rules and investigates potentially defective vehicles. This synergistic cycle of data analysis, planning, research, rulemaking and enforcement is carried out for every rule and other action the Agency prepares and executes.

[www.nhtsa.gov](http://www.nhtsa.gov)

## BMW

Booth 04

The BMW Group is the only manufacturer of automobiles and motorcycles worldwide that concentrates entirely on premium standards and outstanding quality for all its brands and across all relevant segments.

[www.bmw.com](http://www.bmw.com)

## Daimler

Booth 34

A pioneering spirit and power of innovation for sustainable mobility. For almost 125 years we have been developing answers to the automotive challenges of the respective eras. As the inventors of the automobile, we are equally committed to protection of the climate and the environment and to the safety of our vehicles and accident prevention. Our customers - and all other road users - throughout the world can put their trust in this commitment.

[www.daimler.com](http://www.daimler.com)

## TRW

Booth 12

TRW Automotive is the global leader in automotive safety systems and among the world's largest suppliers serving virtually every major vehicle manufacturer. [www.trw.com](http://www.trw.com)

## The ESV Exhibition in Detail

### Volkswagen Group of America

Booth 35

The Volkswagen Group, with its headquarters in Wolfsburg, Germany, is one of the world's leading automobile manufacturers and the largest carmaker in Europe. In 2010, the Group sold more than 7 million vehicles worldwide, corresponding to a 11.3 percent share of the world passenger car market. The Group operates 61 production plants in 15 European countries and a further six countries in the Americas, Asia and Africa. Around the world, almost 370,000 employees produce more than 26,000 vehicles or are involved in vehicle related services. The Volkswagen Group sells its vehicles in more than 153 countries.

[www.volkswagengroupamerica.com](http://www.volkswagengroupamerica.com)

### Robert Bosch LLC

Booth 27

The Bosch Group is a global supplier of technology and services. According to preliminary figures, some 283,500 associates generated sales of 47.3 billion euros in automotive and industrial technology, consumer goods, and building technology in fiscal 2010.

[www.bosch.us](http://www.bosch.us)

### Continental

Booth 02

With sales of €26 billion in 2010, Continental is among the leading automotive suppliers worldwide. As a supplier of brake systems and components for powertrains and chassis, instrumentation, infotainment solutions, vehicle electronics, tires and technical elastomers, Continental contributes to enhanced driving safety and global climate protection. Continental is also an expert partner in networked automobile communication. Continental currently has approximately 155,000 employees in 45 countries.

[www.continental-automotive.com](http://www.continental-automotive.com)

### Takata

Booth 25

Takata Corporation, supplier of seat belts, air bags, steering wheels, electronics, and textiles, has 46 manufacturing locations in 17 countries, and 11 R&D facilities on three continents. Takata employs 30,000 globally, more than 18,000 in North America.

[www.takata.com](http://www.takata.com)

### Applus IDIADA Group

Booth 33

Applus+IDIADA, as a global partner to the automotive industry

worldwide, supports its clients in their product development activities providing design, engineering, testing and homologation services.

[www.idiada.com](http://www.idiada.com)

### Autoliv

Booth 36

Autoliv Inc., the worldwide leader in automotive safety systems, develops and manufactures automotive safety systems for all major automotive manufacturers in the world.

[www.autoliv.com](http://www.autoliv.com)

### DADSS

Booth 17

The Driver Alcohol Detection System for Safety (DADSS) Program is a research partnership between the National Highway Traffic Safety Administration (NHTSA) and the Automotive Coalition for Traffic Safety (ACTS) to explore the feasibility, the potential benefits of, and the public policy challenges associated with a more widespread use of noninvasive technology to prevent alcohol-impaired driving.

[www.dadss.org](http://www.dadss.org)

### Delphi

Booth 38

A leading global supplier of automotive electronics and technologies, Delphi delivers real-world innovations that make products smarter and safer as well as more powerful and efficient.

[www.delphi.com](http://www.delphi.com)

### IEE

Booth 26

IEE is a global leader in automotive safety sensing systems for occupant detection and classification with products such as BodySense™, Seat Belt Reminders, Child Seat Presence and Orientation Detection and Protecto™, enhancing safety and comfort in vehicles produced by major car manufacturers worldwide. Founded in 1989 and headquartered in Luxembourg, the company has operations in Europe, the U.S. and Asia. The company's U.S. subsidiary, IEE Sensing Inc. is based in Auburn Hills, MI.

[www.iee.lu](http://www.iee.lu)

### NCCAR

Booth 37

NCCAR is an independent non-profit automotive testing facility located in northeastern North Carolina on Interstate I95. Available for rental from one hour upwards.

[www.nccar.us](http://www.nccar.us)

# The ESV Exhibition in Detail

**Toyota Motor Corporation**

Booth 24

At Toyota, we strive to advance technologies that help prevent and minimize the crash damage in various situations, toward the ultimate goal of providing safe vehicles for everybody.  
[www.toyota-global.com](http://www.toyota-global.com)

**TASS and Beyond Safe**

Booth 13

Beyond Safe is a joint initiative of TASS, TNO and TTAI to help the automotive industry facing the challenges that arise from increasing market demands for the integrated safety design of cars. Beyond Safe is a strategic partner to OEM's and their suppliers offering a broad range of innovative software and solutions for vehicle safety, dynamics and sustainability that will help to produce safer, cleaner and more fuel efficient vehicles to meet the challenging needs of the future.  
[www.beyondsafe.com](http://www.beyondsafe.com)

TASS provides software, engineering and testing solutions for the development of integrated safety design systems. Building on over 30 years of experience allows us to deliver world-class products and a wide range of services to meet increasing safety requirements. From our headquarters in The Netherlands and worldwide, we work closely with top vehicle manufacturers and their suppliers to provide dedicated solutions to their complex needs.  
[www.tass-safe.com](http://www.tass-safe.com)

**Transportation Research Center Inc.**

Booth 07

Transportation Research Center Inc. manages an independent automotive proving ground providing research and development, compliance and certification testing for manufacturers, government agencies and industry organizations.  
[www.trcpg.com](http://www.trcpg.com)

**911 Emergency & Traffic Alerts  
B+C Electronic Eng., Inc.**

Booth 09

911ETA is a revolutionary Patent Pending technology that augments lights and sirens. We utilize readily available AVL/GPS information to securely and safely warn drivers of RESPONDING emergency vehicles.  
[www.911eta.com](http://www.911eta.com)

**AARP Driver Safety Program**

Booth 06

The AARP Driver Safety Program is the nation's first and largest driver improvement course designed for drivers age 50 and older. Since its inception in 1979, the program has helped millions of drivers stay safe on today's roads. Available in a classroom and online setting, the course is open to AARP members and non-members of all ages, and there are no tests. The course covers topics such as defensive driving techniques, new traffic laws and rules of the road. You may also be eligible to receive an insurance discount, so consult your agent for details.  
[www.aarp.org](http://www.aarp.org)

**Anthony Best Dynamics Ltd**

Booth 18

Anthony Best Dynamics Ltd (ABD) manufactures steering, brake, clutch, gear change and accelerator robots for track based Vehicle Dynamics, ADAS, Durability and Mis-use testing. These can be used either with a driver in the vehicle or for driverless vehicle testing. Other ABD products include the soft crash test vehicle (SCTV) which is used for testing vehicle crash avoidance systems and the SPMM 4000 Suspension Parameter Measurement Machine which is used for Suspension Kinematics and Compliance Testing.  
[www.abd.uk.com](http://www.abd.uk.com)

**Automotive Safety Council**

Booth 14

The Automotive Safety Council is a nonprofit organization committed to the reduction of highway injuries and fatalities through education, regulation, legislation and the implementation of new safety technology. ASC's members are the world's leading automotive safety system and component manufacturers. ASC is celebrating 50 years of savings lives and was previously known as the Automotive Occupant Restraints Council.  
[www.automotivesafetycouncil.org](http://www.automotivesafetycouncil.org)

**Cellbond**

Booth 19

Cellbond specialises in the design, development and manufacture of technology based composite structures for impact absorption. Cellbond provides solutions throughout a wide range of industries including automotive, Rail and Marine.  
[www.encocam.com](http://www.encocam.com)

# The ESV Exhibition in Detail

<b>Comfort Motion Technologies</b>	Booth 28
Comfort Motion Technologies (CMT) power seat software automates subtle changes in the seat position while traveling, reducing tissue fatigue and improving comfort. <a href="http://www.comfortmotion.com">www.comfortmotion.com</a>	
<b>DTS</b>	Booth 21
Diversified Technical Systems specializes in the design and manufacture of ultra-small data acquisition systems and sensors for crash testing, biomechanics/human injury, in-dummy and automotive safety testing.  <a href="http://www.dtsweb.com">www.dtsweb.com</a>	
<b>Dynamic Research, Inc.</b>	Booth 29
Dynamic Research, Inc. (DRI) brings an interdisciplinary approach to research and testing involving advanced technology vehicle systems, vehicle dynamics, human factors, accidentology, and occupant protection. <a href="http://www.dynamicresearchinc.com">www.dynamicresearchinc.com</a>	
<b>Ford</b>	Booth 05
Ford Motor Company is one of the global leaders in the automotive industry, manufacturing or distributing automobiles across six continents. The company's automotive brands include Ford, Lincoln and Mercury. The wide range of types of vehicles available at Ford Motor Company includes cars, crossovers, utilities, trucks and electric vehicles. The motor firm also stocks parts and accessories as well as offers owners services along with vehicle services. <a href="http://www.ford.com">www.ford.com</a>	
<b>Global NCAP</b>	Booth 10
Vehicle Safety is Global—is the theme for the joint presence of 8 NCAP programmes from around the world at the ESV Conference. It reflects the strategic aim that all consumers should have access to safety ratings and information when shopping for a new vehicle.  ANCAP: <a href="http://www.ancap.com.au">www.ancap.com.au</a> Euro NCAP: <a href="http://www.euroncap.com">www.euroncap.com</a> Global NCAP: <a href="http://www.globalncap.org">www.globalncap.org</a> Insurance Institute for Highway Safety: <a href="http://www.iihs.org">www.iihs.org</a> JNCAP: <a href="http://www.nasva.go.jp/mamoru/en">www.nasva.go.jp/mamoru/en</a>	

KNCAP: [www.car.go.kr/index.jsp](http://www.car.go.kr/index.jsp)  
Latin NCAP: [latinncap.com](http://latinncap.com)  
U.S. NCAP: [safercar.gov](http://safercar.gov)

<b>Humanetics</b>	Booth 23
Humanetics is the global leader in occupant safety test & measurement for the development of safer vehicles, ultimately saving lives. <a href="http://www.humaneticsatd.com">www.humaneticsatd.com</a>	
<b>JSP</b>	Booth 39
As a pioneer and world leader in engineered plastic foam technology, JSP created and developed ARPRO® Expanded Polypropylene (EPP), a versatile material for automotive components. <a href="http://www.jsp.com">www.jsp.com</a>	
<b>LifeSafer</b>	Booth 31
LifeSafer Interlock is the leading manufacturer, distributor, and service provider of ignition interlocks installed in vehicles of drunk drivers and home alcohol monitoring units. <a href="http://www.lifesafers.com">www.lifesafers.com</a>	
<b>Magna International</b>	Booth 03
We are the most diversified automotive supplier in the world. We design, develop and manufacture automotive systems, assemblies, modules and components, and engineer and assemble complete vehicles, primarily for sale to original equipment manufacturers (OEMs) of cars and light trucks in our three geographic segments - North America, Europe, and Rest of World (primarily Asia, South America and Africa). <a href="http://www.magna.com">www.magna.com</a>	
<b>Mechanical Simulation Corporation</b>	Booth 01
Mechanical Simulation Corporation develops the world's most validated vehicle dynamics simulation software packages: CarSim, TruckSim, and BikeSim. The software is used by vehicle manufacturers, suppliers and research facilities to simulate the performance of vehicle platforms, vehicle active safety systems, and road designs in complex 3D environments. The software is an integral part of model based design and incorporates software-in-the-loop, hardware-in-the-loop, and man-in-the-loop driving simulator engineering processes. <a href="http://www.Carsim.com">www.Carsim.com</a>	

# The ESV Exhibition in Detail

---

## Meggitt Sensing Systems Booth 08

---

A leading supplier of high-performance products for measurements in suspension systems, anti-lock brake systems testing, airbag deployment, crash test sled, crush zone testing, ATD applications.  
[www.endevco.com](http://www.endevco.com)

---

## NAC Image Technology Booth 32

---

NAC Image Technology has a proven track record of developing high quality, reliable products that satisfy specific high-speed imaging requirements for a variety of applications. Since 1958 NAC has pioneered new uses for image technology in a number of industries and applications. With numerous worldwide installations, NAC is the leading global supplier of high speed cameras.  
[www.nacinc.com](http://www.nacinc.com)

---

## OxTS & Brendel Associates Booth 16

---

OxTS manufactures leading measurement products for the development of advanced driver assistance systems. The RT-Range gives highly accurate vehicle-to-vehicle and lane positioning measurements.  
[www.oxts.com](http://www.oxts.com)

---

## SAFER Booth 11

---

SAFER Vehicle and Traffic Safety Centre is a joint research unit where 24 partners from the Swedish automotive industry, academia and authorities cooperate to save lives.  
[www.chalmers.se/safer](http://www.chalmers.se/safer)

---

## SEA Booth 30

---

S-E-A Vehicle Dynamics performs center-of-gravity and inertia measurements for NHTSA's New Car Assessment Program. S-E-A proudly supplies the U.S. Army with center-of-gravity test equipment to ensure safer military vehicles. We are also pleased to announce the opening of the S-E-A Roll Simulator to test occupant protection systems.  
[www.SEAlimited.com](http://www.SEAlimited.com)

---

## Signum Bildtechnik GmbH Booth 47

---

Signum Bildtechnik is providing Software for professional processing of high-speed image sequences for automotive and me-

chanical engineering companies. Camera control, post processing and analysis of image sequences in 2D and 3D. Assembly and start-up of test stands for crash test facilities and customer specific software-adjustments.  
[www.signumbt.com](http://www.signumbt.com)

---

## VBOX USA Booth 22

---

VBOX USA provides accurate, reliable speed and distance measurement solutions using GPS, including 2cm-accurate Lane Departure, Vehicle Separation, and Collision Warning testing solutions.  
[vboxusa.com](http://vboxusa.com)

---

## Vehicle Certification Agency North America Booth 15

---

Vehicle Certification Agency is the United Kingdom Approval Authority. VCA provides regulatory homologation support services, management system certification to international standards and European Whole Vehicle Type Approval services to manufacturers offering motor vehicles for sale in Europe and many other markets.  
[www.vcana.com](http://www.vcana.com) [www.vca.gov.uk](http://www.vca.gov.uk)

---

## Vision Research Booth 20

---

Vision Research is the manufacturer of the Phantom line of digital high-speed video cameras. Our cameras are used for applications ranging from automotive crash testing to TV documentary production.  
[www.visionresearch.com](http://www.visionresearch.com)

# The ESV Exhibition in Detail

## Exhibition Opening & Tour

Monday, June 13 | 11:00 a.m.–11:30 a.m.

Participants are welcome to attend the Official Exhibition Opening. Lunch will be served following the exhibition hall tour.

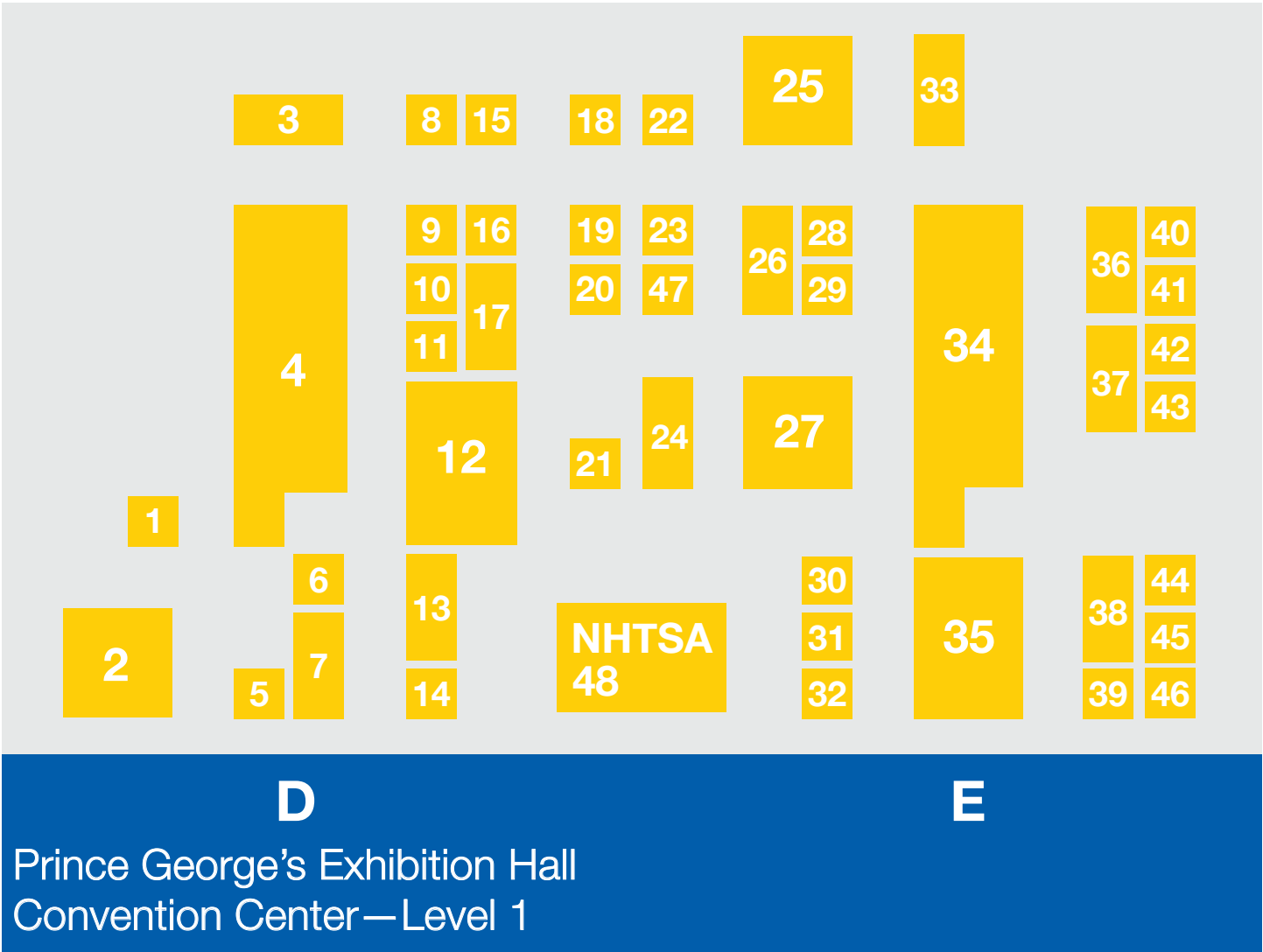
## Exhibition Hours

Monday, June 13 | 11:00 a.m.–3:00 p.m.

Tuesday, June 14 | 9:00 a.m.–5:30 p.m.

Wednesday, June 15 | 9:00 a.m.–5:30 p.m.

Thursday, June 16 | 9:00 a.m.–12:00 p.m.



# The ESV Exhibition in Detail

Company/Institution	Booth
911ETA	09
AARP Driver Safety Program	06
Anthony Best Dynamics LTD	18
Applus+IDIADA	33
AutoLiv North America	36
Automotive Safety Council	14
BMW	04
Cellbond	19
Comfort Motion Technologies	28
Continental	02
DADSS	17
Daimler	34
Delphi	38
DTS	21
Dynamic Research	29
Ford	05
Global NCAP	10
Humanetics	23
IEE S.A.	26
JSP	39
LifeSafer Interlock	31
Magna International	03
Mechanical Simulation	01
Meggitt Sensing Systems	08
NAC Image Technology	32

Company/Institution	Booth
NHTSA	48
North Carolina Center for Automotive Research (NCCAR)	37
OxTS & Brendel Associates	16
SAFER	11
SEA	30
Signum Bildtechnik GmbH	47
Student Design Competition	40-46
Takata	25
TASS & Beyond Safe	13
The Bosch Group	27
Toyota	24
Transportation Research Center	07
TRW Automotive	12
VBOX USA	22
Vehicle Certification Agency North America	15
Vision Research	20
VW-Audi	35



## 22nd ESV Government Focal Points



AUSTRALIA

*Mr. Robert Hogan*

**General Manager**

*Vehicle Safety Standards*

*Department of Transport and Regional Services*



CANADA

*Ms. Suzanne Tylko*

**Chief of the Crashworthiness Division**

*Transport Canada*



EUROPEAN COMMISSION

*Mr. Philippe Jean*

**Directorate General**

**Enterprise and Industry**

*European Commission*



EUROPEAN ENHANCED VEHICLE-  
SAFETY COMMITTEE

*Dr. Dominique Cesari*

**Scientific Director**

*INRETS*



FEDERAL REPUBLIC OF GERMANY

*Dr. Peter Reichelt*

**President**

*Federal Highway Research Institute (BAST)*



FRANCE

*Mr. Bernard Gauvin*

**Ingénieur général des mines**

*Ministère des transports*



HUNGARY

*Mr. János Déak*

**Head of the Technical Coordination Centre  
for EU and –UN–ECE Activities on Road Vehicles**

*KTI/Institute for Transport Sciences*



ITALY

*Dott. Ing. Antonio Erario*

**Head of Division 1**

*International Regulation Affairs*

*Ministry of Infrastructure and Transport*

*Department for Transport*



JAPAN

*Mr. Ryosuke Itazaki*

**Director International Affairs Office, Engineering  
and Safety Department, Road Transport Bureau**

*Ministry of Land Infrastructure and Transport (MLIT)*



POLAND

*Mr. Wojciech Przybylski*

**Technical Development Director**

*Motor Transport Institute (Instytut Transportu  
Samochodowego)*



REPUBLIC OF KOREA

*Mr. Jongwoo Ryu*

**Deputy Director**

*Motor Vehicles Policy Division*

*Ministry of Land, Transport & Maritime Affairs*



SWEDEN

*Mr. Anders Lie*

**Specialist**

*Head Office, Swedish Road Administration*



THE NETHERLANDS

*Mr. Kees Doornheim*

**Head of Vehicle Standards Development**

*RDW Vehicle Approval and Information*



UNITED KINGDOM

*Mr. Bernie Frost*

**Vehicle Standards & Engineering Division**

*Department for Transport*



UNITED STATES OF AMERICA

*Mr. John Maddox*

**Associate Administrator for Vehicle  
Safety Research**

*National Highway Traffic Safety Administration*



GAYLORD NATIONAL®

RESORT & CONVENTION CENTER

*on the Potomac*



Printed on 10% post-consumer recycled fiber.